This document consists of 118 pages. [redacted]

MONTHLY RECORD REPORT

IRRADIATION PROCESSING DEPARTMENT

AUGUST, 1959

73558

Compiled By
IPD Personnel

September 21, 1959

RICHLAND, WASHINGTON

Work performed under Contract No. 2-31-109-ENG-52 between the Atomic Energy Commission and General Electric Company

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IRRADIATION PROCESSING DEPARTMENT
MONTHLY RECORD REPORT
AUGUST, 1959

SUMMARY

RESEARCH AND ENGINEERING OPERATION

No hot spots were found during examination of five charges of "bumper" fuel elements irradiated in the KW Reactor under PT 183-A.

A hazards review was completed and revisions to the present administrative power level limits proposed.

Charging of monitor columns as a part of the Quality Certification Program was initiated this month. The current program will result in evaluation of gross lot quality of natural uranium I and E fuel elements over a one year period.

Process Standard C-010 which replaces the Top of Annulus limit with an operational severity index limit has been issued for all but the K Reactors.

A test charged into KER Loop No. 1 will compare the behavior of twenty-mil and thirty-mil Zircaloy-2 jacketed rods. A Pu-Al cluster element was also charged to provide data for the PRTR fuel development program.

MANUFACTURING OPERATION

Record reactor input production (4.5 per cent above the February, 1959 maximum) was 13.5 per cent above forecast; 13.1 per cent above at the six old reactors and 14.1 per cent above at the K Reactors. Forecast was exceeded due to high time operated efficiency and improved production efficiency resulting from less non-equilibrium losses.

The maximum established power level (combined total for all reactors) was increased 135 megawatts.

Overall time operated efficiency was 84.5 per cent (79 per cent forecast); 83.5 per cent at the six old reactors and 87.6 at the K's. Forecast was exceeded due to improved rupture and scram experience and less outage time for tube replacement. The number of scrams (6) during August was the lowest ever experienced during eight-reactor operation.

Four ruptures, three I and E regular metal and one solid E, were removed from the reactors. The I and E ruptures were at F, H and KE; the E metal at H. This represents the best rupture experience since October, 1956.

Significant items of equipment experience were:

1. Fifty-four process tubes were installed; 17 at D, 17 at H, 9 at DR, 7 at B, and 4 at KE.

2. Six process tube water leaks were corrected; 3 at DR, 2 at H and one at D.

3. The No. 1 prototype pumping set at 190-KE was dismantled for inspection. The impeller of the secondary pumping unit showed cavitation in excess of that permitted by the specifications.

4. Dual area tripout of B and C Reactor process pumps was completed without incident.

5. The final tiein of the two 14 inch steel raw water export lines supplying 105-B and C was completed.

FACILITIES ENGINEERING OPERATION

The downcomer model test program at Washington State University has been reactivated following the receipt of appropriate security clearances.

Inspection of the prototype modified high lift process pump in 190-KE indicated unexpected minor cavitation damage after three month's operation. Steps are being taken to determine the corrections which are required. No significant problem is expected in connection with this condition.

Design activities in support of the reactor confinement project are continuing, with detail design near completion. The various study and test programs are continuing and are near completion.

Final approval was received on the scope material for the KER loop conversion project. Detail design has been started and initial procurement specifications issued for some equipment.

A review of the scope of the K Backup system has been made. Several alterations to the modifications initially proposed for inclusion in this project will be required.

Bids were received for the K Area cap remover. The low bid was approximately twice the available funds.

Development was completed on modifications to the standard charging machine for self supported fuel elements.

Phase I of the development contract with A. O. Smith Company covering feasibility study of on-reactor flash and pressure welding of NPR pressure tubes was completed and reported by the contractor.

Several crews have been instructed in use of engineered methods for some elements of the charge-discharge work. Through use of the new methods, significant reductions in required time for charge-discharge have been achieved by C Processing Operation in recent outages.

The IPD program investigating the reasons for 4500 HP drive motor failures is continuing. The scope for repair and modification to the 100-F outfall system has been issued. River temperature control by regulating of Grand Coulee discharge was started August 7, and is continuing. The second model of the aluminum oxide sulfuric acid feeder for 183-B has been completed and installed.

The reactor process tubes procured from Reynolds Aluminum Company have been analyzed spectrochemically and found to be quite satisfactory. Six of these tubes have been installed in the F Reactor with no difficulties experienced.

Inspection of the CG-558 PW-1419 impeller in the first stage of process pump No. 6 in 190-DR shows no sign of cavitational attack after 3500 hours of operation.

CGI-791 - Reactor Confinement bid package information for filter building construction was forwarded to the AEC on September 1.

RELATIONS PRACTICES OPERATION

Experienced BS/MS recruitment continued active while PhD recruitment decreased to the normal seasonal level. Exempt transfers and terminations within IPD are as follows: two exempt transfers into the Department from other HAPO components; there were no transfers out of the Department; three non-exempt employees were upgraded to exempt status; and one employee resigned to accept outside employment and two summer employees terminated.

Renovation of office space in 1713-B Building for a new 100-B duplicating facility was completed during August. This new facility is tentatively planned to be in operation September 14, 1959.

Mass communication activities included the publication of six Management News Bulletins, one Round Table Guide, two IPD Employee Headliners, six priority messages, four IPD OPG's and six HAPO OPG's were issued during the month.

Salary Administration activities for the month were primarily of a routine nature. Non-routine items included providing consulting service to the recently established Manufacturing Section relative to the establishment of administrative positions. In addition, the Position Relationship Data sheet for the Department was issued.

During August, IPD paid a total of $270 in suggestion awards to 15 suggesters and one supplemental award. The highest award was $80.

There were no disabling injuries reported in IPD during the month. On August 21, 1959, IPD qualified for the Safety Council Award and gift selection lists were distributed to all eligible employees. No security violations were reported during August. The experimental loop testing operation in 189-D Building was conducted on August 15, 1959 and safety aspects were carefully analyzed by operating personnel, outside consultation and IPD's Health and Safety personnel. Additional sprinkler coverage in 1717-K Building has been agreed upon and specifications have been approved. Standardization of acid handling in all Power Operations has been approved and adopted.

FINANCIAL OPERATION

Two meetings were held in August, 1959 with representatives of HAPO Financial Operations to discuss formal procedures for transfer of costs between J.A. Jones Construction and General Electric, as a result of the transfer of certain accounting responsibilities from Construction Engineering and Utilities Operation to J.A. Jones, effective October 1, 1959.

New Production Reactor Section personnel were assisted in the preparation of preliminary cost estimates for 100-N Operation and Maintenance for use in a documental report for Federal Power Commission.

A procedure was established for the accumulation of major repair costs on 4500 HP motors.

IPD's report on Representative Economy Measures was issued on schedule.

A report was issued of the audit of the records supporting the determination of the Safety Council Award achieved on August 21, 1959.

NPR PROJECT OPERATION

Construction work at the 100-N site has consisted of installation and testing of 1400 feet of the six-inch steel water line to be used for the TC fire line. Contracts have been awarded for the 13.8 kv line from 151-D to the N Area site. Grading work has been started on the access roadway, by L. W. Vail Company.

Harvey Aluminum Company appears to have successfully extruded zirconium tubing in 44 foot lengths. Final inspection of these extrusions has not been made. This operation is one of the critical phases of zirconium process tube fabrication.

Charts of three possible organizations for operation of 100-N Reactor have been developed for operational planning. These charts incorporate the organizational structure, describing functional responsibilities for each position.

Kaiser Engineers are preparing a new Project Estimate which will be available September 8. Current indications are that the estimate may be in excess of the $145,000,000 as authorized by Congress.

A total of seven simulated process tube rupture tests have now been run. Results indicate the main potential problem is whether stack lifting in an actual in-pile tube rupture will be sufficiently severe to induce rupture of other tubes. Additional testing will be required to determine this.

The Architect-Engineer has been given sufficient direction to permit proceeding with scope and detail design. Problems of establishing adequacy of scope with minimum delay to the over-all program were discussed with the Architect-Engineer and the Atomic Energy Commission. Bid proposals for the main heat exchangers were reviewed and commented upon.

Reactor plant design work during the month kept pace with the over-all schedule. Scope design has fallen no farther behind schedule. However, development and test support continues to slip.

On heat dissipation system design, a revised scope schedule has been received which indicates work is not now behind schedule but the rate of progress called for over the next few months is substantial so that extraordinary measures will have to be taken to prevent falling behind the revised schedule.

IRRADIATION PROCESSING DEPARTMENT
MONTHLY REPORT OF INVENTIONS OR DISCOVERIES

AUGUST, 1959

All persons engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during the period covered by this report except as listed below. Such persons further advise that, for the period therein covered by this report, notebooks, records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

Name	Title
NONE	NONE

R L Dickman
Acting General Manager
IRRADIATION PROCESSING DEPARTMENT

RESEARCH AND ENGINEERING OPERATION

AUGUST 1959

VISITORS AND BUSINESS TRIPS

M. E. Bergstresser of E. I. du Pont de Nemours & Co., Inc., Aiken, S.C., visited HAPO on 8/11-12/59 to discuss fuel fabrication and other technical problems.

M. S. Brinn, P. A. Towler, R. C. Holmes, H. J. Kamack and M. W. Hartnett of E. I. du Pont de Nemours & Co., Inc., Aiken, S.C., visited HAPO on 8/12/59 to discuss the KER Loops.

R. A. Williamson and R. Lowe of Holmes & Naver Co., Los Angeles, Calif., visited HAPO 8/11-13/59 for discussions regarding potential earthquake hazards.

Dr. F. Neumann of the University of Washington, Seattle, Wn., visited HAPO on 8/14/59 to examine seismoscope settings.

J. M. Smith of General Electric, APED, San Jose, Calif., visited HAPO on 8/18/59 to discuss radiation protection.

B. Grable of Westinghouse Electric Corp., MTR-WAPD Site Operation, Idaho Falls, Idaho, visited HAPO on 8/18-21/59 to discuss loop operations.

J. Bara of Atomics International, Canoga Park, Calif., visited HAPO on 8/21/59 to discuss in-pile experiments.

Lt. Comdr. R. W. Bass and Lieutenants J. S. Pearson, R. T. Herknor, T. J. Walters, J. H. Webber, R. B. Hayman, W. E. Campbell, R. Gardner and V. W. Ponciera, U. S. Navy, Washington, D.C., visited HAPO on 8/25/59 to discuss loop operations.

F. E. Dearing visited the MTR Site Operation, Idaho Falls, Idaho, to discuss operation of the KAPL-120 Loop, 8/2-4/59.

J. E. Hanson visited Westinghouse Electric Corp., Bettis Plant, Pittsburgh, Pa., for KAPL 120-8 Test discussions and to attend the National Heat Transfer Conference, University of Connecticut, Storrs, Conn., 8/5-14/59.

C. G. Lewis and R. E. Baars visited General Atomic, Division of General Dynamics, San Diego, Calif., to discuss operation of the DR Gas Cooled Loop, 8/12-15/59.

W. R. Conley visited Consulting Engineers, Baltimore, Md., to discuss NPR problems, 8/11-14/59.

O. H. Greager visited General Electric, APED, San Jose, Calif., for a meeting with the GE Reactor Safeguards Council, 8/20-21/59.

O. H. Greager attended the GE Reactor Safeguards Council Meeting at Chicago, Ill., 8/27-9/2/59.

ORGANIZATION AND PERSONNEL

	Permanent		*Rotational	
	July	Aug.	July	Aug.
Management & Administration	5	5	-	-
Process & Reactor Development	44	45	11	7
Process Technology	36	35	4	5
Operational Physics	19	19	6	6
Testing	71	69	3	2
	175	173	24	20

* Includes Summer Personnel (August - 5)

Process & Reactor Development: Barbara W. Collins, Secretary, transferred from Facilities Engineering, IPD, 8/3/59. J. A. Roberson, Senior Engineer, Summer Program addition, resigned, 8/25/59. D. W. Peacock, Engineering Assistant, Summer Program addition, resigned, 8/28/59.

Process Technology: R. H. Gay, Engineer II, resigned, 8/6/59.

Operational Physics: D. H. Anderson, Rotational Technical Graduate, Summer Program addition, resigned, 8/21/59.

Testing: N. O. Strand, Engineer I, transferred to NPR Project, IPD, 8/1/59. J. R. Bolliger, Engineer II, transferred from Rotational Training Program, 8/1/59. F. H. Genoe and J. C. Moore, Engineering Assistants, transferred to HLO, 8/31/59.

PROCESS AND REACTOR DEVELOPMENT SUBSECTION

Reactor Fuels

Present Reactor Technology

Quality Certification Program - Irradiation Testing

Charging of one monitor column per fuel element lot was initiated this month. Monitor charges consist of lot sample containing fuel elements which have been weighed, measured and classified by production quality tests. This test program for the evaluation of gross lot quality is scheduled to extend for a one year period using natural uranium I & E elements.

Advanced Reactor Fuels

Nuclear Metals Contract

Work at NMI continues in the area of closure development. Samples of Uranium rod clusters by induction melting have been shipped for laboratory evaluation at HAPO. In this method of closure a Zircalloy cap is welded and is then bonded to the Uranium by induction melting.

Nuclear Metals has been requested to make some additional KER size tubular extrusions to support irradiation testing of end closure designs. Some preliminary and forming operations will be carried out at NMI.

KER Irradiation Tests

Six enriched Zircalloy-2 jacketed seven-rod cluster elements were charged into KER Loop 1 on August 24, to compare the behavior of twenty-mil and thirty-mil jacketed rods. A Pu-Al cluster element was also charged in the same loop to provide information for the PRTR fuel development program.

IBM Fuel Design Program

Initial calculations using IBM program designed for fuel element analysis led to results which were obviously incorrect. The source of the disagreement between these results and previous analysis was determined to lie in the calculation of the resonance escape probability. Corrections have been made and use of the program for fuel design analysis was resumed.

Reactor Physics

Present Reactor Technology

E-N Loads

Charging of the production test is presently held up due to lack of mint slugs. Solid mint should be available on September 1 to charge the fringe blanket portion on the top of H Reactor

Physics calculations were made to estimate the increase in production as a result of the use of enriched mint material. Results of the calculations appear in the table below: The results do not include further increases which could be obtained with a mint blanket as well.

Percentage Li^6	Δ gm Pu and T_3 (Pu-Equiv) over Natural Mint / MWD
Natural 7.5	0
10	0.20%
20	0.61%
30	0.77%
40	0.81%
50	0.85%

The increase reflects primarily the more efficient use of thermal neutrons in Li^6 when the blacker mint slugs are used.

Ceramic Ball Tests

Initial tests in the 305 pile of the ceramic ball material yields inconclusive results primarily due to the low percentages of poison constituents. The tests did show that Eu_2O_3 will increase the control strength of a ball column over that obtained with the boron-steel balls. Higher Eu_2O_3 and Gd-Sm have been ordered to provide quantitative results.

Speed of Reactor Studies

The survey studies of speed of control problems has proceeded to the point where the program is now on the analog computer. The present studies are for I&E Geometry in all reactor lattices. Actual calculations are now underway.

Slowing-down Density in a Lattice

A question of the validity of assuming a constant slowing-down density arose during investigations of methods of calculating resonance escape probability. The periodic lattice was treated as a infinite array of alignment , spaced "a" cm apart, and the age equation was solved. For values of "a" between 10 cm and 38 cm, the slowing-down density was a constant over the lattice to within ten percent.

Advanced Reactor Physics

Special Measurements

Preliminary results for concentric-tube buckle values were reported last month. These results have now been corrected and the final results appear below. The important under-moderated lattice cases have not yet been reached. Tube dimensions are; Outer - 2 1/2" x 2", Inner - 1.66" x 1.1".

TABLE I
PRODUCTION TESTS - FUEL DEVELOPMENT
August, 1959

Test No.	Type Metal	Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
IP-56-A	Low Hydrogen Dingot U Elements	104	D,DR,F,C	Variable		Semi-production scale testing of low hydrogen dingot uranium fuel, solid and I & E.
IP-84-A	Projection	13	B	800 MWD/T 900 MWD/T		Preliminary evaluation of self-supported fuel elements. Low exposure columns discharged at 400 and 600 MWD/T.
IP-95-A	Lead Dip, 1.445"	5	D			Provides for preliminary testing of I & E elements in D-Reactor and for long term corrosion monitoring.
IP-168-A	1.460" O.D. natural I&E	3	C	Variable 800		Long term corrosion monitoring & refinement of operating limits.
IP-171-A	Solid M-388 & C-64-F	5	B,DR,F	Variable 500	520 MWD/T	Provide for evaluation of alternate aluminum component vendors. Control columns are only ones carried special. Rest are lot charged.
	I & E M-388 & C-64-F	6	D,H	Variable 800		

TABLE I (CONT'D)

Test No.	Type Metal	Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
IP-178-A	1.474" O.D. I & E Nat.	6	KE,KW	Variable 800		Provides for irradiation testing of KIII elements, water mixers and long term tube corrosion monitoring.
IP-183-A	CIIN, Bumper Type Projection Elements.	0	KW	600 & 800 MWD/T		Provides for preliminary testing of Bumper type fuel elements in ribbed tubes. Test goal currently being examined.
IP-190-A	Twenty Al. Jacketed Doe Elements	1	KE	20 days at temp.		Discharged July 26, 1959.
IP-216-A	Normal Prod. Nat. OII, KII and KIII fuel elements	9	B,D,DR,F, H,KW,KE	Normal Variable Goal		Provides for monitoring the performance of a sample of all Natural Uranium Lots to assist in development of a Quality Index for Production use. Test is continuous.
IP-220-A	OIIN cores heat-treated in blank form in chloride salt	0	DR	800 MWD/T		Authorizes comparison of the dimensional stability of cores heat-treated in chloride salt in blank form with normal production rods heat-treated in carbonate salt. Test discharged at goal.
IP-226-A	Zr-2 jacketed 1.6% enriched 7-rod cluster elements	2	KE	5000	Loop 2-1600MWD/T Loop 1- 50MWD/T	Charged in KER Loop 2 on May 19, 1959 and KER Loop 1 on Aug. 24, 1959.

TABLE I (CONT'D)

Test No.	Type Metal	Tubes	Reactor	Goal Exposure	Current Exposure	Remarks
IP-231-A	Depleted CII elements	8	C	Nov., 1959	9 months	Authorizes high exposure irradiation of eight columns of depleted uranium to measure effectiveness of process changes made after IP-132-AC failures.
IP-237-A	1.6% Enr. Zr-2 jacketed 7-rod cluster elements	2	KE,KW	2000, 3000	1900, 2500	Charged April 24, 1959 in KW and May 9, 1959 in KE to obtain exposure before failure testing in the ETR.
IP-243-A	Fuel elements clad in components extruded from cast blanks	4	H	Variable OIIE goal		Authorizes changing of six monitor columns and five tons per quarter of OIIE fuel clad in components impacted from cast rather than wrought blanks for rupture comparison with the normal production OIIE. Two columns discharged at goal.
IP-250-A	Four Nat. U tube-and-tube elements	1	KE	2000	200	Discharged July 30, 1959, with failure.
IP-259-A	CIIN	2	C	Variable CIIN goal	100 MWD/T	Authorizes temperature distribution measurement in badly corroded C process tubes.

Lattice	B^2 Wet	B^2 Dry
14 9/16"	-123	+ 55
12 3/8"	- 72	+104
10 3/8"		+ 76 (prelim)

The buckling values for the 14 9/16" lattice space in the Dry case was inadvertently reported as 457 last month, the value should be corrected to read +57.

Analytical Studies

Initial calculations have been carried out in the analog study of the NPR primary loop. Frequency response curves in these cases have been attained for sinusoidal disturbances of control rods and inlet temperatures. Work continues on the computer model for the heat exchanger.

The equations required to compute the power decay in the NPR following a scram have been formulated. This work will be done on the analog computer. Initial attempts will be over-simplified until the heat exchanger can be incorporated.

Reactor Engineering

Existing Reactor Technology

Heat Transfer and Hydraulics

Albrook Laboratory personnel at Washington State University have received security clearances and can now proceed with downcomer model studies. Difficulty continues to be encountered in instrumentation of the DR far downcomer because of procurement of strain gages suitable for installation in the downcomer.

Reactor Hazards

A hazards review was completed and revisions to the present administrative power level limits proposed. The result of the proposal is that the reactors will operate on bulk outlet temperature limits with a supplemental power limit on each reactor type. The details are contained in HW-61580, "Hazards Review - Power Level Limits in Hanford Reactors", by R. E. Trumble, 8-17-59, Secret.

Advanced Reactor Technology

Fuel Geometry and Flow Protection

A method has been developed to account for the effects of supporting hardware on the flow distribution among the several flow channels on concentric tubular fuel elements. Analytical results to date are in agreement with distribution flow data.

Graphite

Irradiation of NPR candidate samples in the GETR was interrupted because of failure of a thermocouple bracket. The samples were discharged, dried, measured weighed and reassembled. They will be recharged in the GETR during the outage beginning September 1.

NPR Hazards Review

A report was written summarizing the knowledge presently available regarding hazards associated with NPR operation. The report presented criteria; a means by which these criteria will be met in the NPR for each of four general areas; speed of control, total control, coolant system reliability, and confinement. In each case the NPR design does meet the criteria.

Decontamination Studies

The nine gram sample was placed in an out of pile loop containing 300 C water, and the water was circulated for four hours. The loop contained in sequence from the Uranium corrosion coupon test sections, a two micron micro-metallic filter, a pump and the heater section. Following the contamination the loop was decontaminated using a solution of H_2O_2 - sodium carbonate - sodium bicarbonate to dissolve the uranium dioxide. followed by rinsing and the APACE process. Activities observed before and after the decontamination process were as follows:

Coupon test section	90 mr/hr to 6 mr/hr
Filter	5 r/hr to 9 mr/hr
Pump	12 mr/hr to 2 mr/hr
Heater	10 mr/hr to 4 mr/hr

In addition decontamination factors and corrosion on individual test coupons of carbon steel, stainless steel and Inconel are being evaluated.

Radiological Engineering

Radiation Control Experience

The following table summarizes the first 32 weeks 1959 radiation exposure experience for the critical IPD classification:

Classification	Total Dose	No. of Employees	Average Dose Employee	Extra-polated Year End Average	No. of Employees over 3r Extra-polated Exposure
Radiation Monitors	107305 mr	85	1262 mr	2050 mr	1
Processing Operators	260663 mr	255	1022 mr	1660 mr	0
Pipefitters	118983 mr	95	1252 mr	2033 mr	6
Millwrights	84643 mr	79	1034 mr	1679 mr	2

Investigation of the high film badge reading for a KER Radiation Monitor for the period ending 7-20-59, mentioned in the July report was completed. As a result of the investigation it must be concluded that the exposure of 1 r as recorded by the film represents the exposure received by the employee.

The following table summarizes the August Lapse of Radiation Control experienced for the Department.

LAPSE OF RADIATION CONTROL
Distribution by Reactor and Component

	B	C	D	DR	F	H	KE	KW	IPD Totals
Processing	0	1	0	1	0	0	1	0	
Maintenance	2	1	1	1	0	0	0	0	
Supplemental Crews	0	0	0	0	0	0	0	0	
Research & Engineering	0	0	0	1	0	0	0	0	
Facilities Engineering	0	0	0	0	0	0	0	0	
Central Maintenance	0	0	0	0	0	0	0	0	
Reactor Areas	0	0	0	0	0	0	0	0	
Assigned Totals	2	1	1	2	0	0	1	0	7
IPD General									0
HAPO									0

Vertical columns do not necessarily add up to the indicated totals, because in some cases, a Lapse of Control may be charged to more than one component.

Effluent Water Data

Average Reactor Effluent Activity Output

	August 1959*	July 1959	August 1958
107-B	29,000 uc/sec.	33,000 uc/sec.	18,000 uc/sec.
107-C	26,000 "	47,000 "	17,000 "
107-KW	39,000 "	48,000 "	34,000 "
107-KE	57,000 "	40,000 "	44,000 "
107-D	21,000 "	19,000 "	16,000 "
107-DR	13,000 "	19,000 "	9,000 "
107-H	12,000 "	20,000 "	19,000 "
107-F	14,000 "	24,000 "	22,000 "

* Effective with August data, 0.0 c/m will be keypunched on reactor effluent analysis cards when no sample is obtained because a reactor is shut down. The change will result in more meaningful averages. Other parameters being equal, the monthly average figures may be expected to be somewhat lower than in the past.

Training

A 20-hour lecture course was presented to three new Radiation Monitor Trainees.

Instrumentation

Criticality Monitoring

The criteria for criticality monitoring in IPD facilities was issued.

Effluent Water Monitoring

The transistorized 128 channel pulse height analyzer set up at F Reactor was used during the month to evaluate its potential as a monitor for fuel element failures. Two situations were studied which consummated in the discharge of ruptured slugs. One was at F Reactor. Samples of header water run on the analyzer showed results which were conclusive that a ruptured slug existed some 30 hours before positive indicatinns were obtained by present detection methods. In the other situatinn, at KE Reactor, the critical period in the history of the suspect header involved a weekend. Difficulty in obtaining and delivering samples to F Reactor did nbt allow as complete analyses as were desirable. In this case results did not positively indicate a rupture. The reactor was shut down for reasons other than a ruptured slug. A check of rear face nozzles of tubes supplying the suspect header revealed the presence of the rupture.

Reactor Effluent Water

Supplement A to Production Test Authorization IP-197-A has been approved and preliminary work has begun. In this test chemicals will be added to the effluent water for a single process tube and the build-up of radioisotopes will be studied.

PROCESS TECHNOLOGY OPERATION

REACTOR POWER LEVEL LIMITATIONS

The limits to all reactor power levels at the end of the report period except at D Reactor were based on fuel element failure control at the goal exposure currently in effect. At D Reactor the bulk outlet temperature limit was the most restricting limit.

WATER TREATMENT

Raw Water Conditions

During the month the suspended particles remaining in the filtered water are of the type which deposit in the reactor tubes. As a result turbidity is being kept low.

Plant Tests

A test has begun to determine the effects of alum addition to filter effluent flume as a film removing agent.

PROCESS STANDARDS

HW-46000 D, Process Standards - Reactor

One revised Standard was issued during the month. This was:

Process Standard C-010 - "Prevention of Excessive Slug Rupture Rates"

The former method of preventing excessive slug rupture rates was a gradual exploration of higher tube power regions. This was accomplished by limiting reactors to a small incremental power increase per week.

Studies have determined that tube outlet temperature also has a decided influence upon rupture rate. Thus, the combined effect of power and temperature has been expressed as an Operational Severity Index to provide a more accurate measurement of the effect of operating the reactor under more severe conditions. The revised Standard places a limit on the amount the OSI can be increased in any seven day period.

With the issue of this revised Standard, the TOA Corrosion Standard (A-022) was rescinded and removed from the manual. TOA limits were established about 15 months ago to prevent excessive corrosion ruptures of I & E slugs. Experience has shown that the same degree of rupture protection can be gained through use of OSI limits which are less restrictive on reactor production.

HW-46000 F and HW-46000 H, Process Standard - Reactor

Six revised Standards were issued during the month for these two manuals. These were:

Process Standard A-010 - "Process Piping"

Sections of the Standard were revised as follows:

1. Inspection requirements for front and rear face fittings were added. The requirements are expected to assist in detection of abnormally leaking fittings and faulty pigtails before such conditions can endanger the reactor.

2. Definitions of pigtail and other fitting failures were added. Conditions under which operation is permitted when the rear pigtail fails on a tube containing fissionable slugs were also added.

3. Operation with cavitation occurring in the front pigtail was clarified in this revision.

4. The revision clarified the desired orientation of the primary and secondary orifices, and a statement concerning a preferred tube orifice design was included to reduce the problems associated with critical flow through these fittings.

Process Standard A-040 - "Process Water Trip Settings"

Since the change to an I & E slug loading, there has been considerable difficulty in raising water pressure high enough prior to startup to reset the #1 Safety Circuit LP trip. The revision permits a new, lower pressure trip setting. This reduction is believed to be the last of several trip pressure changes that have been necessary as the number of I & E charges increased.

Process Standard B-010 - "Gas Composition, Pressure and Flow"

Information concerning allowable Helium-CO_2 ratios has been deleted from the Standard. These specifications are a reactor control problem and have been moved to Standard C-040. The Standard was revised to identify and limit gas impurities (oxygen and nitrogen) that enter the reactor primarily from air leakage. Action to be taken when limits are exceeded was also included. Use of Orsat analyses during operation was limited to times when the more sensitive O_2 Analyzer is out of order.

The frequency of routine mass spectrographic analyses remains unchanged. However, the frequency of the special spectrographic analyses required when O_2 concentration is above 0.05 per cent was lowered as long as the continuous O_2 analyzer remains operable.

Lower limits on maximum inlet dewpoint were added to the Standard. These are based on a revaluation of the effect of moisture upon reactor components. The lower limits will reduce the amount of water the gas stream could carry into the reactor. Also, a precautionary paragraph was added regarding sudden gas pressure increases that may be caused by water leaks.

Process Standard C-040 - "Graphite Temperature Limits"

The revision consisted of transferring allowable He-CO_2 ratios and a curve of

graphite temperature limits from Standard B-010, as these reactor control functions more appropriately belong in this Standard.

Process Standard C-110 - "Ball 3X System"

A specific value for the Ball 3X LP trip pressure setting was incorporated in this revision. This trip is a part of the Ball 3X water pressure decay protection system and was formerly specified by reference to the companion #1 Safety Circuit trip. Because the #1 Safety Circuit LP trip was removed, it was necessary to change the method of specifying the Ball 3X trip setting. The revision also incorporated provisions to ensure that Ball 3X water pressure decay protection is automatically available at all times during operation.

Process Standard F-020 - "Make-Up of Tube Charges"

The Standard no longer contains charge make-up specifications for C and J slugs. These slugs have economical and reactor control aspects that make further use undesirable. The enriched slug specifications now pertain only to enriched uranium (E) slugs.

HW-46000 K, Process Standards - Reactor

Four revised Standards were issued during the month. These were:

Process Standard B-010 - "Gas Composition, Pressure and Flow"

Process Standard C-040 - "Graphite Temperature Limits"

The revisions are identical to those issued for HW-46000 F, above.

Process Standard A-021 - "Tube Outlet Water Temperature Limit - TOA BOILING Limit"

TOA BOILING limits for natural (KIIN) and enriched (CIIE) slug charges containing a mixing slug were added to the Standard. The higher boiling limit allowed when mixing slugs are used will permit an increase in tube power. Formerly, immediate shutdown was required if a TOA BOILING limit was exceeded. It has been determined that over-runs of 3°C can be safely tolerated if the temperatures are returned within limits in 30 minutes or less. Temperature over-runs greater than 3°C require an immediate shutdown.

Process Standard A-030 - "Pressure, Flow During Reactor Shutdown"

Curves for determining water shut-off time for single drained tubes as a function of reactor downtime were revised to cover the higher current and anticipated tube powers.

PROCESS CHANGE AUTHORIZATIONS

Seven Process Change Authorizations were issued during the month to permit temporary deviation from Process Standards - Reactor, HW-46000, and one was issued to permit temporary deviation from Process Standards - Water Plant,

HW-27155 Revl. These were:

PCA #9-89 - "Removal of Export Capability, F-Reactor"

It was necessary to remove the export header from service at F Reactor to permit a six inch line to be tied into the 36 inch raw water export header for use in a pump test facility. Because F Reactor does not normally export raw water, the PCA permitted removal of the export header from service for a short time to allow this work to be done. Requirements for line inspection and a time limitation were specified. The work being done did not interfere with the import of raw water to F Reactor.

PCA #9-90 - "KER Loops 2, 3, and 4 - KE-Reactor"

The PCA extended the provisions of PCA #9-67. The expiring PCA specified test pressure for hydrostatic tests, pressurizer relief valve settings and rupture disc ratings for the new zirconium tubes installed in Loops 2 and 3. The new PCA also extended the test specifications to recently installed Loop 4.

PCA #9-91 - "Thermal Shield Cooling, K Reactors"

The PCA authorized a change in the range of thermal shield temperature. This range is defined by a high outlet temperature limit for shield cooling water, and a low temperature limit for the shield membrane. The range defined by these limits controls the thermal gradient through the concrete pad. The modification of limits authorized by the PCA will not significantly affect control of the thermal gradient through the pad, but will allow adjustment of limits to compensate for cooling water inlet temperature variations of the cooling water.

PCA #9-92 - "Ball 3X LP and VLP Trip Settings, F Reactor"

When F Reactor changed from seven to eight process pumps, a change in riser pressure LP and VLP trip settings, consistent with the riser pressure increase, was not made Although the existing trip settings were not optimum, they were adequate. The PCA permitted continued operation with existing settings, but required adjustment on the first minimum outage.

PCA #9-93 - "Rear Header Pressure Requirements - F Reactor"

Tube outlet temperature limits are based in part on rear crossheader pressure. Two rear crossheaders at F were from two to four psi above the pressure used in calculating the existing limits. New calculations were made to determine the effect of the increased rear header pressures, and the requirements necessary to operate above the Standard pressure. The PCA permitted operation with rear header pressure up to five psi higher than Standard, provided a specified increase in Panellit gauge minimum low trip pressure was observed.

PCA #9-94 - "By-Pass of Panellit Gauge on Tubes Containing Non-Fissionable Material During a Solids Purge"

C Reactor performs solids purges during operation. The drop in Panellit pressure during a purge on tubes charged with non-fissionable material may be larger than the trip range of the gauge. Because the magnitude of the

change is not predictable, the potential for an unnecessary scram is great. The PCA permitted by-pass of Panellit gauges on tubes containing non-fissionable material during a solids purge, provided the gauges were continuously monitored and the reactor manually scrammed immediately upon indication of flow loss to the tube.

PCA #9-95 - "OC-DF Empty Tube Analysis With the Rear Ball Valve Closed"

The PCA extended the provisions of PCA #9-75. The expiring PCA provided a procedure for verifying that an OC-DF tube is empty when the rear ball valve is closed. Monitoring requirements were specified to ensure reactor safety during use of this procedure.

PCA #9-96 - TOA Corrosion Limits - KE Reactor"

The TOA Corrosion limit was established to reduce the potential for sustaining large numbers of corrosion induced ruptured slugs. Recent studies have indicated that the limit can be made less restrictive. The PCA authorized a conservative increase in the TOA Corrosion limit of 5°C on a maximum of 25 tubes at KE Reactor.

PROCESS ASSISTANCE

Auditing

One engineer audited conformance to Process Standards on all Processing Operation's shifts.

Graphics

Graphics services prepared 30 charts, graphs, and visual aids for various IPD and HLO components.

RUPTURE EXPERIENCE

Failure Date	Tube No.	Lot No.	Type Metal	Exposure	Type of Failure
8/1/59	3395 H	KE-055-A	6" Solid E	946	Split-Long
8/21/59	2453 F	CL-007-C	8" I & E Natural	886	Side-Other
8/21/59	3790 H	KL-188-D	8" I & E Natural	727	Unknown
8/24/59	2384 KE	SK-057-D	8" I & E Natural	817	Unknown

Legend:

Split-Long - Failure caused by uranium cleavage along the axis of the core.

Side Other - Failure probably caused by corrosion or water penetration of the exterior can wall or other unknown mechanism.

Unknown - Failed slug could not be located.

OPERATIONAL PHYSICS OPERATION

PILE PHYSICS ASSISTANCE

Accompanying the excellent operating continuity in August was high flattening efficiency. Average equilibrium ECT's exceeded 76 per cent of all reactor tubes for the first time since April. This flattening efficiency record was achieved despite large uranium discharges at several reactors; initial use of central spike enrichment to compensate for the low residual exposures and increased use of splines for equilibrium flattening at D, KE and KW contributed significantly.

Subcritical monitoring installation was initiated by project forces in August at F and B Reactors; one channel was completed at B in time to be used successfully during a startup near the end of the report period.

Preliminary plans were formulated for converting from the inhour reactivity unit to the excess k system by the end of 1959. A reactivity unit of 10^{-5} k will be used.

SUMMARY OF OPERATING DATA OF PHYSICS INTERESTS FOR THE MONTH OF JULY, 1959

Pile	B	C	D	DR	F	H	KE	KW
ECT in August (1)	1430	1640	1480	1535	1440	1600	2485	2475
12 Mo. Avg. ECT	1435	1630	1455	1515	1435	1575	2405	2440
Equil. Scram Time (2)	15-17	12-14*	18-20	28-32	16-24	25-30	18-24*	18-24*
No. of Scrams and Recoveries (3)	1/1 1/0	1/1 0/0	0/0 0/0	0/0 0/0	0/0 1/0	0/0 0/0	0/0 0/0	0/0 2/0
No. of Non-Scram Outages (4)	3/0	1/1	2/1	1/1	2/0	3/0	2/0	2/0
Report Period - From:	7/27	7/24	7/27	7/24	7/28	7/24	7/25	7/25
To:	8/25	8/24	8/25	8/24	8/25	8/24	8/24	8/24

* Equilibrium scram recoveries are not attempted at the C and K Reactors.

(1) Effective Central Tubes: this value is defined as the pile power divided by the average of the ten most productive nonenrichment tubes in the pile. These values represent the average during equilibrium operation.

(2) This is defined as the maximum time available in minutes between scram and the first indication of startup.

(3) The first pair of numbers show the number of brief outages from which secondary cold startups would be made and the number of successful startups. The second pair show the number of brief outages from which hot startups would be made and the number of successful recoveries.

(4) The first number shows the number of ordinary outages (including those initiated by scrams followed by unsuccessful recovery attempts), and the second shows the number of additional outages to discharge temporary poison.

B Reactor - W. R. Smit

Operating continuity during the report period was above average. There were only two full length shutdowns; one was scheduled, the other resulted from an unexplained Panellit trip at equilibrium. One short outage was necessary for minor repairs.

The first installation of CG-707, Subcritical Monitoring, was completed in one channel and was used successfully during the startup of 8-27.

A slightly modified equilibrium rod pattern used in an attempt to reduce flux peaking and lower the center graphite temperature was only partially successful: the limited temperature reduction was offset by a small radial flattening efficiency decrease. Charging of four central spike enrichment columns for initial experience resulted in some improvement in control flexibility and flattening.

Serviceability of all seven graphite stringers after the startup on 8-27 significantly improved the quality of the instrumentation necessary for efficient flux distribution control.

C Reactor - R. L. Ferguson

Operational continuity was excellent; it was interrupted only by a scheduled shutdown and a Panellit scram during the following startup.

Although one of the octant inputs to the No. 1 Galvanometer was repaired, sensitivity remained below normal due to continued loss of two of the eight inputs from the octant monitors. Repairs were limited to one input during the outage because of radiation exposure limitations.

A large discharge which reduced the inpile residual exposure to 200 MWD/T and initial charging of water mixing slugs made it necessary to charge 13 extra enriched columns and to discharge 26 inhours of poison to compensate for the resulting equilibrium reactivity loss.

D Reactor - W. L. Stiede

A thirty-eight day operating period ended on 8-17 with a scheduled outage. Following the startup another shutdown was necessary to repair a process tube leak. An estimated 100 inhour reactivity loss resulted from water which collected in the graphite lattice.

Approximately 70 tons of metal were discharged following the long operating period. To compensate for the associated large reactivity loss, nine columns of "spike" enrichment were charged. During the scheduled outage eight poison splines were removed; removal equipment failure occurred in two instances. It was possible to isolate the cause of these two failures and make suitable corrections to prevent recurrence.

DR Reactor - D. I. Monnie

Operating continuity was interrupted only by one nine-day shutdown which was initiated to repair a water leak. Analysis of shutdown reactivity data

DR Reactor (Continued)

indicated that charging 675 tubes with 32 pieces instead of the normal 34 pieces per tube resulted in a loss of 28 inhours of reactivity; this observation agrees with the theoretical value well within the range of experimental error.

F Reactor - R. A. Chitwood

Operation was relatively smooth and continuous, being interrupted only by a scram due to a rear pigtail failure and a shutdown due to an I & E rupture. Low reactivity resulting from a reduced residual exposure in the central zone limited flattening efficiency early in the report period. "Spike" enrichment will be used in the future to compensate during periods of low exposure.

A critical prediction error of 100 ih in the liberal direction on a cold startup resulted primarily from lack of similar startup types on which to base standard reactivity coefficients. A 100 inhour error is within the error margin protected against by required conservative rod withdrawal procedures.

H Reactor - G. R. Gallagher

A two per cent increase in the equilibrium ECT over the average ECT for the past year was shown this month. One rupture, a water leak, and a combination rupture and water leak caused shutdowns during the report period. A temporary flux distortion resulted from water in the lattice following one of the water leaks.

A production test for use of a limited number of split enrichment columns for spike locations is being circulated for signature. The top of the H Reactor has been chosen as the location for the E-N demonstration fringe blanket, PT IP-255-A-9-FP, which is expected to be charged during September.

KE Reactor - F. C. Franklin

Operating continuity was relatively good with only one scheduled outage and one unscheduled outage for a KER rupture. An increase of about three per cent in equilibrium flattening and improved cycle control at high exposures resulted from the increased use of poison splines, use of "split" poison columns (poison on the ends and dummies in the center), and close control by the operating personnel. Previous experience at these high exposures normally resulted in approximately four or five per cent lower power levels for cycle control purposes.

KW Reactor - A. D. Vaughn

Operating continuity, flattening efficiency, and flux distribution stability were relatively good. Two shutdowns, one for a Panellit scram and one for temperature monitor failure, interrupted operation this month.

The spline system was used to advantage when for the first time 5 splines were charged in rapid sequence rather than singly. These splines eliminated a distributional flux cycle, reduced limiting tube power, and corrected an

KW Reactor (Continued)

unfavorable control rod configuration. Use of two splines in the near-bottom corner of the pile during startups significantly reduced turnaround control problems. Such limited use for startups will be continued during the period of short supply of solid splines.

PROCESS PHYSICS STUDIES

Safety Control Studies

Analog studies of reactivity and power excursions following poison flushing or unintentional rod withdrawal during equilibrium operation have been completed. Results, which indicate that under-pile Beckman instrumentation needs augmenting for bulk limit protection, are being documented. Further studies are proceeding to evaluate the protection which might be provided by the zone temperature monitor.

Although 3-dimension control analyses are necessary for fully defining control capacity limitations, they still appear to be inherently too cumbersome for even IBM-709 storage capacity. It will be necessary, therefore, to work closely with other technical groups to ensure use of optimum approximation methods for going from one to two to three dimensions.

Pile Reactivity Studies

Reactivity contributed by the enrichment ring at each production reactor will be evaluated this month by the buckling method in place of the former over-extrapolated weighting methods.

The study to calculate representative radial and longitudinal flux distributions under rod configuration and mixer location extremes at the various reactors has been completed in final rough draft form.

Participation was initiated in an NPR Operation paper study in conjunction with other R & E groups and with Design Analysis. The first approach for Operational Physics will be to determine that the reactivity transients independent of thermal loop feedback can be reasonably controlled. Subsequent studies incorporating feedback effects will require close coordination with the other engineering and physics analyses. Results of this paper study should assist not only in detail design, but in establishing the scope of the experimental startup program well in advance. Serious startup planning should start two years ahead of testing, or only a year from now.

Control Efficiency Studies

In-pile performance of solid splines has been good, permitting effective use of splines for equilibrium flattening efficiency at D and the K's. Eductor and chopper problems have continued to occur during discharges which were accomplished for the most part during normal outages. Spline use will be largely restricted during the next two or three months to equilibrium use until normal purchase procedures can supplement the present development prototype spline inventory.

Control Efficiency Studies (Continued)

Final components for the 6-tube Poison Column Displacement Facility prototype are expected to arrive on plant momentarily. Preliminary installation work has proceeded on schedule. I & E Mint pieces have not been received to date because of fuel fabrication problems.

Reporting of flattening and startup efficiencies and potential gains will henceforth be documented on a six months summary basis rather than month by month; results will be more meaningfully interpreted on this basis.

Discussions have been initiated with DR Processing on the possibility of deliberate discharge cycle testing. Specific reasons exist for excluding the other reactors at this stage: Greater production is committed at a K pile, C pile is more prone to outages because of metal testing PT's, H pile may become involved in a special loading, and the chute capacities of the B-D-F piles are limited.

Reactor Fundamentals Training

Off-time evening classes for Reactor Specialists are scheduled to resume for the fall and winter on September 8. Fundamentals classes were given for the specialists previously; classes this fall will cover classified material directly applicable to their work.

One eight-hour reactor fundamentals series for engineering personnel is scheduled for presentation during September.

Shielding Studies

The IBM-709 program indicates that the proposed iron limonite concrete having a specific gravity slightly over four will be nearly ideal for the present inlet-outlet shield design. The less attractive magnetite limonite case considered a specific gravity of 3.3.

The F pile top shield approached 150°C maximum temperatures during July and August with a 30% helium atmosphere. Temperatures improved considerably as the helium content approached 50% during late August. H pile top shield temperatures continue to run in the 150-160°C range. Slight relief may be afforded by the blacker poison in the proposed e-n blanket demonstration (PT IP-255-A-9-FP).

IRRADIATION TESTING

KAPL-120 Loop

The in-reactor tube was on process water cooling during this period.

The No. 3 pump is being repaired at the Bettis Plant.

A spare parts pool and loop operating problems were the subject for discussion at meetings with WAPD personnel at MTR-ETR on August 3 and 4 and at HAPO August 18, 19 and 20. It was agreed that the first spare parts list would be ready for comparison by September 7. Discussions concerning the purity of make-up water revealed that the HAPO system could be improved rather easily. The WAPD representatives are investigating the possibility of supplying a de-oxygenating resin system for the KAPL-120 Loop. The reliability of the three main loop check valves is not sufficient to permit loop operation while containing a fuel test without valve repair or replacement. Replacement valves were recently ordered by the Bettis Plant and are not expected to be available for eight or more months. Arrangements have been made to obtain replacement parts for immediate delivery from Crane Company.

A report, HW-61372, "Calculation of Fission Heat Generation Rate in KAPL Loop," by W. L. Bunch, dated August 3, 1959, was completed. This document summarizes the Hanford Test Pile data which were obtained to estimate the fission heat generation of the Naval Reactor fuel plates as a function of enrichment.

DR Gas Loop

The final cleaning of the emergency gas storage tanks is the only remaining construction exception item.

The Technical Shops (HLO) have completed their portion of the repair of the damaged compressors. One rotating assembly has been replated and balanced at the General Engineering Laboratory and has been installed in the compressor case. Subsequent test stand runs were satisfactory. The second rotating assembly has been sent to General Engineering Laboratory for balancing.

A major portion of the X-1 level has been restricted since early in the report period as a result of radiations leaking from a newly installed sub-critical monitor assembly. This deficiency was corrected by month end.

Because of the restricted access to the loop equipment, it was not possible to complete the necessary maintenance work, operational testing, and leak rate investigation by September 1 and the scheduled completion date has been set back accordingly.

General Atomic has submitted a proposal describing a UO_2-BeO fuel element for the first gas loop fuel test. Investigations to date would indicate that this element is acceptable at least with regard to fission gas release. A P3 calculation was made to compare the effect of using 1/4 inch diameter fuel

pellets as compared to 1/2 inch diameter UC_2-C fuel pellets originally proposed by General Atomic. The calculation indicated that, for the same total U-235 content, the volume average flux in the smaller pellets would be about 6 per cent lower than that in the larger graphite pellets. It was concluded that a Hanford Test Pile irradiation of smaller UO_2-BeO pellets would not be necessary.

During discussions at General Atomic, it was decided that HAPO should scope the loop revisions necessary to accommodate a fission gas release in the order of 10 per cent. Such a revision would permit the testing of the UC_2-C fuel bodies.

Other Off-Site Irradiation Tests

The irradiation of control rod materials proposed for the Hallam reactor has been considerably revised by Atomics International, and was discussed at HAPO with their representative.

HAPO Fuel Element Irradiations

The irradiation of enriched seven-rod cluster fuel elements in test hole 3674 KW and 3674 KE continues. As of August 19, the fuel elements had reached 88 per cent and 113 per cent of the goal exposure, respectively.

Other Irradiation Tests and Services

1. A total of 16 sets of activation analysis samples were irradiated in the PCCF facilities at D and DR reactors. These samples are identified as follows:

   a. Ten sets of HAPO-184 samples in support of a Washington Designated Program assigned to Hanford Laboratories Operation.

   b. Four sets of natural uranium samples (HAPO-218) in support of an investigation of the release of fission products from uranium at high temperatures in oxidizing atmospheres.

   c. Two sets of effluent water residue samples (HAPO-172) in support of Hanford Laboratories Operation's study of the radioisotopes in effluent water.

2. A total of 15 samples were irradiated in the Quickie Facility (E test hole) in F reactor. These samples are identified as follows:

   a. Two samples of UO_3 (HAPO-227) to provide a Np^{239} tracer in support of Hanford Laboratories Operation's chemical separations study.

   b. Two samples of UO_2 (HAPO-229) in support of Hanford Laboratories Operation's study of the effect of neutron irradiation and fission events on the structure of thin foils of UO_2.

   c. Three samples of commercially pure titanium (HAPO-223) to determine the initial radioactivity and decay characteristics of titanium.

This material is being considered for use in the in-pile portion of a Quickie facility and in the NPR safety rods.

d. Eight cobalt-aluminum alloy samples (HAPO-223) to provide standard sources for the D Processing Operation's underwater weasel.

3. Two graphite samples, coated with temperature sensitive paint (HAPO-220) were irradiated in the Snout facility (4 C test hole) at KW reactor. This test was conducted to determine if neutron irradiation will affect the temperature sensitivity of the paint.

4. Thirteen baskets began exposure and 13 baskets completed exposure in the KE gamma facilities. The bulk of these irradiations are being sponsored by the Non-Metallic Materials Development Operation, Hanford Laboratories Operation.

5. The test assembly in 1573 DR which is designed to provide temperatures of graphite samples in the 200-300 C range continues (HAPO-124). One of the four sets of samples being irradiated is operating below the desired range (128 C). Electrical measurements indicate that this heater has burned out.

6. The irradiation of a test capsule to determine to what extent the electrical output of thermocouples is affected by the gaseous atmosphere which surrounds the thermocouple bead continues in the 2A test hole at KW reactor (HAPO-199). The thermocouple beads are currently being irradiated in an atmosphere consisting of a helium, carbon dioxide mixture.

Vertical Bowing Measurements

A summary of the results of vertical bowing measurements follows. All distances are from the pile skin.

Area	Date	Tube No.	Depth	Results
105-KE	7-31-59	Z-1	43'6"	No previous data
105-KE	7-31-59	Z-3	11'6"	No previous data
105-KE	7-31-59	Z-5	43'6"	No previous data

COOLANT TESTING

During August, 1959, activities of the Coolant Testing Operation included operation of the 1706-KE in-reactor and out-of-reactor equipment, operation of the 1706-KER in-reactor loops, and installation of new equipment and revisions.

A summary record of activities involving each facility follows, including significant items of performance, changes and improvements.

1706-KE Single-Pass Tubes (PT-IP-197-A)

The six central zone single-pass tubes continued operation at the same conditions as last month, namely:

Tube	pH	Water	Dichromate
4355	7.0	Filtered	1 ppm
4456	7.0	Filtered	2 ppm
4557	7.0	Process	--
4863	7.0	Process	--
4963	6.5	Process	--
5063	6.5	Process	--

1706-KE Mock-Up Tubes

The mock-up tubes were operated during the month for the following tests:

1. Corrosion evaluation of electro-nickel plated slugs in process water at 120 C.

2. Corrosion evaluation of chemically nickel-plated slugs in process water at 165 C.

3. Evaluation of special coupon holders for use in normal process tubes, using process water at 130 C.

4. Raw water corrosion of carbon steel at 140 C raw water temperature.

5. Hydriding effect of 110 C process water on etched and unetched Zr-2 coupons. Aluminum and stainless steel samples are being pretreated for decontamination studies along with this testing.

Out-of-Reactor Loops

1. ELMO-5

The loop continued operation during the month at 290 C and pH 10.0 for tests on:

a. Samples of carbon steel and stainless steel which have previously been exposed to various decontamination processes. Aside from initial corrosion following decontamination, corrosion rates do not appear to have changed significantly.

b. Surface treatments of carbon steel and stainless steel coupons for decontamination studies.

c. Oxygen scavenging, using hydrazine as a scavenging agent.

2. ELMO-6

The loop continued operation at 300 C and pH 4.5 for tests on:

a. Comparison of X-8001 aluminum alloy corrosion in static and dynamic systems.

b. Long-term corrosion of Zircaloy-2 samples which have been exposed to the Turco decontamination processes.

c. Corrosion tests on Inconel X coupons and 400 series stainless steel valve parts.

d. High velocity corrosion studies of X-8001 aluminum alloy. At 35 feet per second, considerable removal of the protective film began to occur.

3. ELMO-7

During the month, tests continued on:

a. NPR screwed nozzle-to-tube joint running at a constant 575 F. This joint has started leaking and testing is continuing to determine leakage increase rates.

b. Marmon-Conoseal cap test. This test has continued operation under cycling conditions. The cap seal has begun leaking and testing is continuing to determine the rate of leakage increase.

c. Canadian rolled-joint nozzle-to-tube connection. This joint was cycled 2080 times between 325 F and 510 F at 1400 psi with no leakage. The joint is now cycling between 400 F and 550 F at 1800 psi with no leakage.

During the month, a test was begun on a modified KER nozzle cap for use with thermocouple trains.

4. ELMO-8

A shake-down run at 2500 psi and 300 C was completed early in the month. Testing was discontinued for the balance of the month to allow construction forces to complete punch list items in the immediate vicinity of the loop.

5. ELMO-10

The loop was shut down during most of the month due to corrosion failures of sections of loop piping and alterations necessary to provide adequate draining for the loop.

6. Dowtherm Unit

The Dowtherm unit remained shut down during the month, awaiting preparation and installation of heater wiring.

7. CEP-1

The loop continued operation during the month on an extended series of Turco decontamination tests to determine long-range effects of Turco on loop components and materials. Coupons of stainless steel, stellite and Zircaloy-2, stressed samples of stainless steel, and Zr-2 NPR tube sections are being corrosion tested.

8. CEP-2 and CEP-4

Installation of these loops is not yet complete.

9. REP Loop

This loop is used for testing of decontamination processes following gross contamination by previously irradiated uranium.

During the month a second APACE decontamination test was run following last month's relatively unsuccessful APACE decontamination of the highly contaminated loop. The second test was successful, bringing loop activity down to less than that attained by one cycle of the Turco 4501 process.

Later in the month, the loop was again highly contaminated and a decontamination test is being run using the Westinghouse COD (S_4) process.

10. ORA-1

The loop continued operation at 700 F during the month. A test was completed using 400 to 500 ppm water to determine effects of water on corrosion rates of magnesium alloys, aluminum, and carbon steel. Corrosion rates on magnesium alloys increased from less than one mil per month, with low water content, to 8-12 mils per month with high water concentrations. The loop was later effectively scavenged of water using magnesium turnings as the scavenging agent.

11. 107 Basin Sealant Test

Testing of hot-water leakage rates through Bentonite and cinder filler materials continued during the month.

KER Loops

1. Loop 1

The loop remained shut down until the August 24 reactor outage, when the loop was charged with six enriched 20 and 30 mil wall Zr-2 clad, seven-rod cluster elements and a Pu-Al Zr-2-clad, seven-rod cluster element, as authorized by PT-IP-226-A, Supplement B.

2. Loop 2

The loop continued operation at approximately 265 C and pH 10.0 until August 17 when apparent increase in tube power forced reduction of outlet temperature to 255 C during the balance of the month. The charge consists of seven, seven-rod Zr-2 clad enriched clusters and a thermocouple train, authorized by PT IP-226-A, Supplement A.

3. Loops 3 and 4

These loops operated on in-reactor recirculation with dummies charged during the early part of the month. On August 7, 1959, they were placed on single-pass process water cooling and the loops shut down for

maintenance and revisions. The loops remained shut down during the month, awaiting fuel element test charges.

Coolant Testing Operation Outage Performance

A total of 1.5 hours of reactor outage time was charged to Coolant Testing Operation during the month. This time was used in charging fuel elements authorized by PT IP-226-A, Supplement B into Loop 1 during the August 24 reactor outage.

No reactor shutdowns were caused by Coolant Testing Operation activities during the month.

COMPONENT TESTING

Irradiated Fuel Element Examination

Fuel elements from the following 28 tubes were examined at the Metal Examination Facility during the month of August:

P.T. No.	Tube No.	P.T. No.	Tube No.
183-A	3452-KW	197-A	4456-KE
	3455-KW		4457-KE
	3457-KW		4863-KE
	3458-KW		4963-KE
	3553-KW		5063-KE
	3556-KW	207-A	2474-C
	3652-KW	210-A	0583-C
	3654-KW		0790-C
	3657-KW		0891-C
	3658-KW		1493-C
	3660-KW		1893-C
	3655-KW		2893-C
	3758-KW		3293-C
197-A	4355-KE		3393-C

Examinations conducted on five charges of "bumper" fuel elements, PT 183-A, "Evaluation of Projection Fuel Elements for Uses in K Process Tubes", have revealed no hot spots on the surface of these fuel elements. The normal production fuel elements from eight control tubes, which were irradiated as a part of this Production Test, revealed only one hot spot.

Probolog Development

Work continued toward developing the Probolog for fuel element spire wall thickness measuring. Five tubes of PT 183-A material, which were probologged prior to irradiation, were checked during the month. Comparison of the pre- and post -irradiation traces revealed a large change as a result of the irradiation; however, the big difference appears to be in the bond defects which also affect the probe. Another difficulty lies in the fact that only a few mils of corrosion have resulted from the irradiation and this is quite

difficult to detect. An irradiated fuel element can be measured and said to have an average wall thickness of 40 mils ± 5 per cent, however, the same statement could be made regarding the fuel element prior to irradiation. The same difficulty was encountered in attempting to measure the corrosion in tubes between charges. An attempt is being made to find a suitable standard and method devised such that the test fuel element can be compared with the standard before and after irradiation. Plans also are being made to Probolog a number of fuel elements which have been rejected by 300 Area testers in an effort to learn how bond defects affect results.

Dejacketer Vent Line

A new section of six-inch plastic pipe was installed and pressure tested. This line conveys the reaction vessel exhaust gases to the 105-C exhaust stack. Rerouting of the line was necessary because a new filter building for Project CGI-791, "Reactor Confinement," and will be constructed where the previous line was located. During the initial excavation to determine the exact location of the line, two sections were exposed and dejacketing cycles were performed to determine radiation levels at these points. The radiation levels remained unchanged during the test. Loose contamination accounted for readings of 3 mr/hr and exhaust gases did not raise the readings. Eleven fuel elements from PT 93-A were stripped for the test.

Ultrasonic Bond Testing

An additional 12 tubes from PT 210-A were bond tested. During the routine examination of the pieces from this test, 80 slugs were selected because of hot spots and hot areas. Twenty of the 80 pieces contained unbonded areas that ranged from ½ to 1½ inches longitudinally and ½ to 1 inch circumferentially. The new bond test calibrator was received and placed into service. This device calibrates the bond tester discriminator circuit to reject a known unbond area by a count-rate method. The five-inch scope and rotational and translational indicating dials assembly was completed and installed in the bond test console.

Process Tube Corrosion Monitoring Program

In-reactor measurements of 173 process tubes were made during the month. Listed below are the numbers of tubes measured per reactor and document numbers of the reports issued.

Reactor	No. of Tubes Probologged	Report No.	HW Number
H	49.	35	61405
B	37	36	61472
C	17	37	61477
D	40	38	61601
F	30	39	61677

Visual examinations on wall thickness and rib height measurements were completed on two tubes from F reactor and five tubes from H reactor. The two tubes from F reactor and four of the tubes from H reactor were removed and examined to investigate the extent of the accelerated top of tube corrosion

in second generation process tubes. Measurements revealed that the corrosion rate was normal on these second generation tubes. The fifth tube (0279-H) from H reactor was a leaker. The leak was found 10.5 feet from the rear van stone flange caused by external corrosion. Three other tubes were examined from F reactor, but no measurements taken. Tubes 2453-F and 4575-F were examined to see what caused the charge to be stuck. In tube 2453-F a ruptured slug had blown a hole in the tube. Tube 4575-F had evidence of severe bowing in the reactor; examination of tube 4261-F verified the presence of external corrosion adjacent to the front gun barrel, as had been interpreted from the Probolog trace.

A sector probe (which measures the tube wall thickness just on one sector of the tube circumference) developed by Instrument Development personnel was tested at a recent outage at C reactor. Mechanical features which prevented successful operation of this probe were: 1) the probe was very difficult to insert in the process tube, 2) the probe had a tendency to ride on the ribs rather than between the ribs as intended, and 3) the probe runner wheels picked up excessive radioactive contamination, which was very difficult to remove.

Panellit Programs

During the month 250 gages were processed by Maintenance personnel. Of this number 142 were rejected for a rejection rate of 56.8 per cent, a 12.8 per cent increase over last month's gage processing activities.

In-board reliability examinations were performed on 436 gages. Thirty-nine of this number were found to be defective and subsequently removed from service. This is a percentage defective of 8.9, well in line with expected gage service longevity of 10 per cent defective per year.

A total of 3784 gages received "in-board" Bourdon coil leak examinations. Sixteen gages were confirmed as having leaking Bourdon coils. This is a leak frequency rate of 0.42 per cent, 0.05 per cent below the average leak frequency rate of 0.47 per cent. Average leak frequency rate is established through some 80,000 leak examinations during the past 20 months.

Response times were determined for a total of 4336 gage-sensing line (gage to manifold) combinations during the month. Of this total, 453 combinations were found to have response times in excess of those currently acceptable, for a slow response detection rate of 10.4 per cent. Slow response varied from just over the 60-cycle maximum to as much as 400 cycles. In all cases, corrective action served to reduce response times to a point well below the 60-cycle maximum.

During the month failure analysis were performed on 17 Panellit gages which had failed during, or subsequent to, reactor operating periods.

PT IP-266-B, for reactor testing of the 2B-X1 and 2B-X2 Panellit gage switches, was approved during the month. Installation of new switches on gages has been accomplished for the first group of 58 gages, and they were installed in the KW reactor Panellit panel on August 31.

Design Change No. 313 was approved during the month. This change provides for vertical coordinate scram "light indication" seal-in. Original system vertical coordinate light indication seal-in was accomplished through vertical relay circuitry which was removed to eliminate circuitry feed-back problems. Design Change 313 permits functional advantages of light indication seal-in without feed-back complications.

INVENTIONS

All Research and Engineering Operation personnel engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during August except as listed below. Such persons further advise that, for the period therein covered by this report, notebook records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

Inventor	Title
None	None

O. H. Greager

Manager, Research and Engineering
IRRADIATION PROCESSING DEPARTMENT

B-C REACTOR OPERATION
AUGUST, 1959

I. ORGANIZATION AND FUNCTIONS - No change.

II. PERSONNEL

A. Force Summary

	July 31			August 31			Net change
	E	NE	Total	E	NE	Total	of Total
B-C General	6	3	9	5	3	8	-1
B Processing	16	83	54	16	38	54	0
C Processing	16	34	50	16	35	51	+1
B-C Power	14	94	108	14	95	109	+1
B-C Maintenance	23	106	129	23	105	128	-1
Total	75	275	350	74	276	350	0

B. Movement of People - Exempt: G. V. R. Smith, Specialist-Administrative Programs, was promoted to Specialist and transferred 8-1-59 to NPR Project Operation. Nonexempt: Two transfers in, 1 reactivation and 2 terminations (1 leave of absence, 1 dropped for extended absence without leave).

III. PERSONNEL ACTIVITIES - W. D. Burch and C. E. Guthrie of ORNL, Oak Ridge, Tennessee, toured C Reactor facilities August 6; D. Stonebridge of Brookhaven National Laboratory visited 100-C Area August 24; R. L. Plum of HOO-AEC and H. B. Atkinson of AEC, Washington D. C. visited C Reactor facilities 8-20.

IV. SAFETY AND SECURITY - There were 13 medical treatment injuries, 3 serious accidents, no disabling injuries, no fires or security violations. Serious Accidents: Accident No. 59-10 at Building 105-C on August 5, Accident No. 59-11 at Building 105-C on August 13, and Accident No. 59-12 at Mile Post 7, Road 4 North on August 24; no lost-time injuries resulted; details are provided in I.P.D. Safety Investigation Reports.

V. NON-ROUTINE REPORTS - None were issued.

VI. COMPONENT ACTIVITIES

General

A. Administrative Activities - Coordination was provided during management review of the FY 1960 budget on Equipment and General Plant projects and the assignment of priorities for action by Project Engineering Operation. Plans were firmed up for obtaining several exempt personnel from other components. An interim salary review was conducted. Plans were started for obtaining Rotational Technical Graduates.

B. Personnel Development - One Technical Graduate continued his rotational program assignment with C Processing Operation. Eight exempt-roll employees were scheduled for participation in the Professional Business Management-I course starting in September.

C. Cost Control Activities - Upper levels for control of overtime usage during the first half of FY 1960 were assigned to operating and maintenance components. A "target" budget for FY 1960 operating costs is being prepared for distribution to the operating components.

D. Landlord - Work on the 190-B Tank Room roof, and the Main Badge House was continued. Lighting improvements in some offices were started.

E. Suggestions - In progress at start of month - 45; received - 22; completed - 25; end - 42. These figures were adjusted to account for some assigned to other components.

B PROCESSING OPERATION

A. Production - Input production was 110.0 percent of forecast. Limiting factors were tube power and graphite temperature. TOE for the month was 77.5 percent. Rupture considerations required a reduction in tube powers early in the month due to higher inlet water temperatures. The release of cooler water from Coulee Dam permitted the tube-power limit to be restored to the previous level before month-end.

B. Operating Experience - There was one scheduled and two unscheduled outages; one of which was a scram recovery.

Day	Hours	Cause
4	89.4	Scheduled for charging, maintenance, project work, dual area trip-out test.
7	0.8	Failure of HCR's A and 6 to move properly.
24	77.4	Panellit scram, row 16; probably oscillating gauge. charge-discharge, maintenance and project work.

During the August 4 outage, six tubes were replaced and one air channel (0771) was retubed. The tie-in of the new raw water supply line was completed.

C. Equipment Experience - New thermowells for the power calculator were installed in the effluent line. Nine 3X ball hoppers were replaced to reduce radiation levels in preparation for planned Ball 3X electrical modifications. Geminol graphite stringers were installed in channels 1073, 1284, 3466, and 3484. 78 tubes were probologged; five were recharged solid aluminum due to thin tube walls. 14 rear-face bellows were filled with silicone foam. Seven defective rear neoprene boots were replaced. The sphincter seals for No. 4 HCR and No. 27 VSR failed and were replaced. 11 faulty thermocouples were repaired. New brake assemblies were installed on Nos. 7 and 9 horizontal rods.

C. Improvement Experience - Production Test IP-084-A, "Evaluation of Slugs Having Projections for Use in Ribless Tubes" four tubes were discharged and recharged.

CG-707, "Improvements to Reactor Nuclear Instrumentation" - New carriages, fission chambers, and step plugs were installed in "D" test hole on the X-level. The control-room instrument panel was also installed. The "D" hole

assembly was used during the last initial cold startup with excellent results. The thimble assembly only has been installed in "A" test hole. CG-791, "Reactor Confinement" - The installation of piping for the rear-face fog spray system is complete. A new panel for instrumentation was installed in the control room. The filtered water tie-in for the filter building was completed. CG-817, "Crossheader Pressure Differential Indicators" - Front- and rear-face crossheader pressure taps were installed during outages and some front-face tubing was installed during operation. The installation of lines for continuous rear-face air monitoring is complete except for the D elevator trail hose. Work was begun on the installation of an access hole from the top of the unit to the rear-face catwalk. The removal of slug traps (old brackets) from the back wall of the rear face was completed.

E. Radiation Monitoring Experience - A Maintenance employee contaminated his hand to 800 c/m while undressing but was readily decontaminated. The bed, steering wheel and gear shift knob of a pick-up truck were found contaminated to 3,000 c/m; the vehicle was decontaminated. Dose rates as shown by 40 check points in the rear face remained at last month's level of 65 mr/hr. Personnel dose rates up to the following levels were experienced· Ball 3X lock-bar installation - 50 mr/hr.; removal of balls from 3X hoppers - 80 mr/hr.; discharge operations - 100 mr/hr.; maintenance work in rear face - 120 mr/hr.; mattress plate removal- 150 mr/hr.; foam filling of rear bellows - 100 mr/hr.; tube cutting at tech view pit - 200 mr/hr.; burial of old chambers from X-level - 400 mr/hr.; graphite stringer removal - 120 mr/hr. The average activity of the effluent water at 107 outlet was 917 mrads/operating day, with a maximum activity of 1,428 mrads/day.

F. Events Influencing Costs - 560 overtime hours were used. Total helium consumption was 266,355 cubic feet as compared to 567,613 cubic feet in July. 1,200 pieces of poison and 9,200 dummies were reclaimed.

C PROCESSING OPERATION

A. Production - Input production was 117.4 percent of forecast. Power level was controlled by a tube power rupture control limit. The TOE was 83.5.

B. Operating Experience - Two scheduled and one unscheduled (Scram recovery) outages were experienced.

Day	Hours	Cause
4	106.3	Scheduled raw water tie-in and trip-out test.
8	0.6	Panellit scram (cause undetermined).
31	15.5	Scheduled T/C installation, fog spray, piping, and foam rear bellows, continued over month-end.

C. Equipment Experience - A stuck charge was encountered in tube 4661 and was discharged at 4,500 pounds. The slugs could not be retrieved for examination, but rear-face reading did not indicate a ruptured slug. 52 faulty tube outlet thermocouples were repaired. Straight type connectors were installed on 81 nozzles; 87 connectors remain to be completed.

D. Improvement Experience - PT-IP-85-A - "Water Shutoff During Shutdown at C Reactor" - was conducted on Tube 2084. PT-IP-259-A - "Measurement of

Annular Temperature Distribution in Badly Corroded Process Tubes - C Reactor" - Downstream thermocouple trains were installed in tubes 3285 and 3386. PT-IP-245-A - "Dual Area Trip-Out of B and C Reactor Process Pumps" - The tests were performed on August 8 without incident. CG-791- Reactor Confinement - The fog spray piping installation in the discharge area was essentially completed and was tied into the water supply.

E. Radiation Monitoring Experience - Maximum personnel dose rates for various jobs were: discharge area to push down chutes - 1,500; ball 3X tunnel to modify present system - 2,000; inner rod room for maintenance on octant monitor - 150; metal examination facility for maintenance work inside basins - 300; experimental levels for sample recovery - 1,500. There was one instance of personnel clothing contamination and the items were easily decontaminated.

F. Events Influencing Costs - 372 overtime hours were required.

POWER OPERATION

A. Operating Experience - 100-B Area took over the pumping demand for the Raw Water Export System on August 10, requiring the use of all 181 B/C pumps. The final tie-in of the two 14 inch steel raw water export lines supplying 105-B and 105-C was completed August 5; cast iron bell and spigot raw water export lines in 100 B and C have now been eliminated. Dual Area Trip-Out Tests were conducted on August 7, according to schedule; the boiler load pickup was very satisfactory; response was very fast and there was no "hunting" or overshooting."

B. Equipment Experience - At 190-C Building, the governor bearing was replaced on No. 12 pump unit and the inboard pump seal was repaired. At 190-B Building, the carbon seal was repaired on No. 7A pump. The hi-level deareator valve in 184-B was replaced.

C. Improvement Experience - Impeller modification on the CG-558 pumps has been discontinued during eight-pump operation. The impeller on the No. 11 pump in 190-C was replaced with the new design impeller. 58-IP Aluminum Oxide Sulphuric Acid Feeders, 183-B - installation of new prototype Reaction Chamber was started. E-78781 - Replacement of 20-Inch Raw Water Line - completed August 5, except for minor details. A-90668 Repair 190-B Tank Room Roof - Royal Roofing (subcontractor) has replaced the defective built-up roofing; rejected metal flashing has also been replaced.

D. Events Influencing Costs - Coal costs increased due to increased steam generation. Replacement of export water lines also increased cost.

MAINTENANCE OPERATION

A. Equipment Experience - At B Reactor, 14 rear bellows were foamed and 3 rubber silicone bellows were installed to reduce gas losses. 19 of the 20 mattress plates were replaced in the B Reactor chutes. Alterations were started on the charge elevators at B and C for improved tube replacement equipment. Earth quake indications were noted on the B and C seismoscopes, the high tanks and the 190 storage tanks on August 17, but inspections revealed no apparent damage. The rear-face catwalk at C was completed in preparation for the thermocouple outage; 28 new thermocouple bundles were fabricated.

50 inoperable thermocouples were repaired at C. Class C inspections were completed on all 190-B 4,500 HP motors.

B. Maintenance Engineering

Pressure Monitor Surge Suppressors - B and C Reactors - Vendor contacts were made to assist in correcting fabrication difficulties in soldering of the capillary tubing. Revised surge suppressors are scheduled for delivery in September for evaluation.

Far Riser Vent - 105-B - Design Change No. 310 has been approved for the modification of the far riser vent line. Access holes have been made and expansion joint is on site.

C. Planning and Scheduling - 8,261 manhours of Productive Maintanance were scheduled and 95% was completed.

A. R. Maguire

Manager
B-C REACTOR OPERATION

AR Maguire:ILH:dip

D-DR REACTOR OPERATION
SEPTEMBER, 1959

I. ORGANIZATION AND FUNCTIONS - No Change

II. PERSONNEL

A. Force Summary

	July 31, 1959			August 31, 1959			Net
	NE	E	Total	NE	E	Total	Change
General	2	4	6	3	5	8	+ 2
D Processing	39	15	54	39	16	55	+ 1
DR Processing	33	15	48	33	15	48	
Power	101	14	115	100	14	114	- 1
Maintenance	130	24	154	132	21	153	- 1
	305	72	377	307	71	378	+ 1

B. Movement of People - The following organization changes were effective August 1. A. E. Brown, Assignment Supervisor, D Processing Operation was promoted to Supervisor, 100 Operations I, D Processing Operation to fill a vacancy. L. C. Goodwi Supervisor, 100 Power II, D-DR Power Operation, was promoted to Supervisor, 100 Power I, D-DR Power Operation, replacing A. E. Brown. G. R. Klingler, Maintenance Engineer II, D-DR Maintenance Operation, was transferred to D Processing Operation and assigned as Specialist, Reactor Operation for development purposes.

Effective August 15, E. A. Grimm, Supervisor, 100 Operations I, D Processing Operation, was transferred to the NPR Project Section as Engineer I. He was replaced, effective August 17, by the transfer of J. P. McBride, Supervisor, 100 Operations I, from KE Processing Operation.

Effective August 24, W. D. Richmond, Manager, H Reactor Operation, was transferred to D-DR Reactor Operation in the same position replacing J. H. Brown.

Nonexempt personnel movement during August included 3 transfers in, 2 transfers out, 1 termination due to death and 2 returnees to the nonexempt roll on completion of temporary exempt roll assignments.

Within the Administrative Group, Mary R. Theivagt, Secretary, transferred from H Reactor Operation to D-DR Reactor Operation, effective August 24 as secretary to the Manager, Reactor Operation.

III. PERSONNEL ACTIVITIES - Routine

IV. SAFETY AND SECURITY - There were 15 medical treatment injuries and no security violations. A series of four Safety Information meetings were held on August 14 for all 100-D Area people to celebrate one year without a disabling injury and to review the accomplishement of ten nonconsecutive injury free years since the startup of 100-D Area in 1944. Eighty per cent of 100-D Area residents attended these meetings which included safety skits and congratulatory messages from management.

V. NON-ROUTINE REPORTS - None were issued

[redacted]
Cc-1

II. COMPONENT ACTIVITIES

A. Administration - A mid-year review of D-DR Reactor Operation exempt salaries was made in connection with the IPD review.

B. Suggestions - Suggestions in process at beginning of month 37, submitted 7, reopened 1, completed 14, in process at month end 31.

C. Personnel Development - R. J. Schier, Manager, Relations Operation held an Information and Discussion meeting with exempt D-DR Reactor Operation employees on the reorganization of Employee Relation functions and related subjects.

One Rotational Technical Graduate began assignment within D-DR Reactor Operation during the month. One Technical Graduate was on assignment to the Operation at month end.

D. Cost Control - A special FY-1960 operating cost forecast for D-DR Reactor Operation was prepared for internal use. A cost meeting was conducted by representatives of the Financial Section, dealing with the processing of work orders. Discussion included the use of the IBM in work order processing and the compiling of monthly summaries.

E. Landlord - "Renovation of Building 1713-D", Project CGI-807, was completed, with exceptions, on August 14. This building houses office and laboratory facilities for the Instrument and Electrical Development Operations. The first of the vending machines planned for 105-D, 105-DR and 1717-D Area were placed in operation on August 25. A parking lot was completed on the west side of Building 1704-D and placed in use during the month to alleviate prevalent parking congestion.

D PROCESSING OPERATION

A. Production

Input production was 102.3 per cent of official forecast. Operating levels were limited by the bulk outlet temperature limit. Time operated efficiency for August was 83.0 per cent,, 96.5 per cent of forecast.

B. Operating Experience

1. Operating Continuity - There were two outages during the month as follows:

Date	Hours	Reason
8-17-59	96.9	Scheduled outage, charge-discharge
8-22-59	29.9	Water leak, tube 3786-D
Total	126.8	

2. Equipment Experience - Seventeen tubes were replaced during the month, 16 during the scheduled outage because of thin walls and external corrosion and one leaking tube after startup. Flattening was controlled with 12 splines inserted, 8 removed with 5 in the reactor at month end. Limited difficulty was experienced with these solid splines, one fouling in the chopper during removal.

2. Equipment Experience (Continued)

A lead glass viewer for the rear face was installed in the 30' lead room. Operation of the reactor was unaffected by high sensitivity seismoscope alarms on August 8 and 17.

C. Improvement Experience - CG-780 - "Improved Ventilation - Buildings 105 and 115-B, D, and F" - Project work is complete at 105-D except for installation of a gravity roof exhauster at 115-D and final adjustment to the air balance. CG-791 - "Reactor Confinement" - Preparation for construction of the filter building continued during the month. The far high tank sensing lines were relocated, and the fence to enclose the construction site was completed. CG-817 - "Crossheader Differential Indicator and Alarm System" - Construction work was completed and the system was placed in operation. Acceptance tests have not been completed. CG-666 - "Zone Temperature Monitor" - The rear face terminal board was inspected to check for possible corrosion.

D. Radiation Monitoring Experience - A lapse of radiation control occurred when an employee picked up a radioactive speck on his sock while removing protective clothing. Dose rates received ranged to 2 R/hr. during such operations as spline removal, gas tunnel valving, 115-D valving and Ball 3X maintenance. Four cases of skin contamination occurred, the maximum at 50,000 c/m.

E. Events Influencing Cost

1. Overtime - A total of 141.5 hours of overtime was used during the month.

Nonexempt Shift Overlap	15.0 Hours
Shutdown Coverage	110.5
Exempt Overtime	16.0
Total	141.5 Hours

DR PROCESSING OPERATION

A. Production - Input production was 116.9 per cent of the official forecast. Time operated efficiency was 89.9 per cent, 105.8 per cent of official forecast. Production was higher than forecast due primarily to the cancellation of tube replacement. August production was an all-time high for DR Reactor.

B. Operating Experience

1. Operating Continuity - Operation was interrupted by two unscheduled outages.

Date	Hours	Reason
8-25-59	74.7	Unscheduled outage caused by water leaks in tubes 1462, 2869, and 2873. Replaced 6 other tubes.
8-28-59	0.3	Spurious panellit scram on unknown gauge on 08 row.
Total	75.0	

[redacted]
Cc-3

2. Equipment Experience - Nine tubes were replaced during the month, 3 for water leaks and 6 for out-of-pile examination. Boroscoping of #2 HCR channel is planned for a future outage since it has been sticking at 240" out. Baffle reinforcing and pressure taps were installed in the far downcomer bringing the job to 90 per cent completion. High sensitivity seismoscope trips and galvonometer indications coincided with the earthquakes in the region, but no damage to reactor components was observed.

C. Improvement Experience - CG-707 - "Improvements to Reactor Nuclear Instrumentation" - The neutron leakage at "A" test hole was corrected by addition of more shielding. A permanent solution is being sought. Operation of the Recirculating Gas Loop was virtually at a standstill during the month due to this neutron leakage. CG-791 - "Reactor Confinement" - The paths of the filtered water supply line to the far high tank and the fire and sanitary water line were altered to make room for the ductwork from the 105 Building to the filter building. A portion of the wiring to the Control Room was also completed. CG-706 - "Improved Gas Instrumentation" - Some tubing and instruments were installed for this project. AEC-160 - "Recirculating Gas Loop" - Minimum activity was possible due to high neutron dose rate from leakage from "A" test hole. Additional performance testing was accomplished. "Rear Cap Conveyor and Carts" - The prototype rear cap conveyor and cap carts were used for the first time during the outage this month. Movies of the uncapping and capping operations were taken by the Industrial Engineering personnel. These will be studied in order to evaluate the prototype conveyor concept and to further improve the "set-up" and "button-up" rates.

D. Radiation Monitoring Experience - Two lapses of radiation control occurred during the month. One was the result of unmarked buried contamination, the other facial and nasal contamination to an R&E employee, received when decanning a HAPO 184 sample. The latter contamination was 10,000 c/m on the face and 350 d/m from a nasal smear. Source was gas bubbles escaping a vacuum hood. Exposure control was favorable during the month. There was one case of low level skin contamination and one of personal clothing contamination.

E. Events Influencing Cost - The overtime usage rate was 4.95 per cent. This high rate is generally attributable to working a major portion of the unscheduled outage on overtime. Unit cost is expected to drop because of the record production month.

D-DR POWER OPERATION

A. Operating Experience - Boiler operation was satisfactory during August. The steam generating load was 115,184 pounds per hour average and 190,000 pounds per hour maximum. The evaporation rate was 7.99. Water quality at 183-D/DR Water Plants was controlled with little difficulty during August. A special inspection of the export system and other underground water lines was made on August 18 due to the earthquakes. No leaks were found.

B. Equipment Experience - Pump maintenance during the month included disassembly of #4 at 181-D for investigation of vibration and #4 condenser pump at 182-D, found with a cracked shaft and needing a new impeller. A liquid dichromate feed system was placed in service August 15 on receipt of the first liquid shipment from Pasco.

C. Events Influencing Cost - No unusual variations.

D-DR MAINTENANCE OPERATION

A. Equipment Experience - A new approach in saving tubes for out-of-pile examination was made this month in both reactors. Tubes are split and pulled through the chutes to the storage basin intact. The procedure will save 50 per cent of the time formerly required after adequate training in procedure and insures positive identification of tubes. During other outage work at D, 29 thermocouples were repaired, 461 panellit gauges flushed and oiled and seismoscope triggers and relays overhauled.

B. Maintenance Engineering - Reactor Safety Circuit Trip Identification - The final section of duct work between the electric room and the junction box behind the Panellit board was installed. The cables for this duct are on hand and wire tags have been made up. A sample vertical jumper was handmade by a member of the Project Engineering Operation which more nearly meets the requirements of the installation. Further vendor information as to cost and delivery dates for manufacture of this new jumper is needed before a final decision for awarding a purchase contract can be made. Ball 3X Phano-Charger Annunciator - Installation of a new annunciator, with its source on the out-put side of the phano-charger to detect a failure before the batteries are drained to a dangerously low level, has been completed at 105-D. A similar installation is planned at 105-DR. Gamma Monitor High Trip Indicator, 105-D - Installation of Design Change 303-D providing a rapid means of identifying which of the six gamma monitor recorders has experienced either a high or low trip was completed. "AsBuilding" of the existing prints remains. DR Downcomer - Far downcomer liner modifications and installation of pipe runs to accommodate pressure instrumentation to be installed by FEO were completed. Development of strain gauge instrumentation is behind schedule so that preparation for it cannot proceed for the present. Discharge Chute Vibrator - Falling metal damaged the head and blocked the air supply hose on the vibrator during its initial use at 105-D. Modifications to overcome these inadequacies are in progress. Rear Face Decontamination Facilities - Modifications to the solids purge tanks in both D-DR Reactors to facilitate handling Turco solutions were completed. Painting, in progress, will complete presently planned renovations. Further improvements to this system will come about through project action.

C. Planning and Scheduling - During the month 5 Class A, 24 Class B and 56 Class C inspections and overhauls were made. The P.M. program was retarded due to other maintenance work that was given a higher priority.

D. Events Influencing Cost - During the month it was necessary to use overtime as follows:

Nonexempt - 997 manhours
Exempt - 196 manhours

W. D. Richmond, Manager
D-DR Reactor Operation

WDR:JDR:ab

F REACTOR OPERATION
AUGUST - 1959

I. ORGANIZATION AND FUNCTIONS

No change.

II. PERSONNEL

A. Force Report

	July 31			August 31			Net Change
	E	NE	Total	E	NE	Total	of Total
General	3	2	5	3	2	5	0
Processing	15	38	53	15	37	52	-1
Power	7	51	58	7	51	58	0
Maintenance	14	72	86	14	71	85	-1
Total	39	163	202	39	161	200	-2

B. Movement of People

There were no changes in exempt personnel during the month.

Nonexempt personnel changes included one resignation and one leave of absence.

III. PERSONNEL ACTIVITIES

M. J. Smith, Lighting Specialist from Nela Park, visited the 105 Building to investigate building lighting problems. Various changes were recommended to improve building lighting.

IV. SAFETY & SECURITY

There were five medical treatment injuries reported. No disabling injuries and no security violations were reported.

V. NONROUTINE REPORTS ISSUED

None.

VI. COMPONENT ACTIVITIES

GENERAL

A. Administration - The Reactor Operation Manager held one Conference Table Meeting with 13 nonexempt employees in attendance.

B. Personnel Development - O. C. Allred, J. G. Herdan, E. C. Moran, and M. J. Wise enrolled in the PBM-I Series VI sessions which will commence in September. E. J. O'Black will serve as a PBM course group leader.

C. Costs - A new form was developed for use by component managers in forecasting costs and comparing actual versus estimated costs; in addition, a new procedure was devised to streamline the presentation of cost figures in the monthly cost meeting.

D. Landlord - Work started on August 6 on relocation of the new badge house and perimeter fence.

E. Suggestion Evaluation - Suggestions on hand at start of month: 50; received: 6; evaluated and returned: 7; on hand at end of month: 49.

F PROCESSING OPERATION

A. Production - Input production was 120.8 percent of forecast, with a TOE of 87.7 percent. Maximum operating levels were limited by rupture control tube power limits.

B. Operating Experience

1. Operating Continuity

Outage Date	Hours	Reason
8/6/59	37.7	Ruptured rear pigtail on 3788-F.
8/21/59	54.1	Rupture in tube 2453-F.

C. Equipment Experience

1. Tube Replacement - A total of 30 tubes was probologged this month. One tube was sufficiently corroded to warrant replacement. Tube No. 4261 was removed and the channel blanked off.

2. Stuck Charge - During flushing operations prior to probologging on August 21, the charge in 4575 was found to be stuck. Unsuccessful attempts were made with the charge machine and Blackhawk jack to discharge the tube. Removal was hindered by the lodging of metal on the tipoff, but was finally accomplished by backseating with a hand jack and discharging with a push pole. The tube was removed and channel blanked off.

3. Rupture - One I & E metal rupture occurred in tube 2453. The charge would not move in attempts to discharge with the charge machine and Blackhawk jack at pressures to 3500 psi. The downstream dummies and nine pieces of metal were flushed. The charge was moved back and forth with jacks at a maximum of 6000 psi. The pressure fell off and the metal discharged with the charge machine. The tube was removed and the channel blanked off.

4. Cap and Pigtail Inspections - All front caps and front and rear pigtails were inspected. Three front caps were found to be faulty and were replaced. Sixteen front pigtails were replaced because of broken strands in the reinforcing braid. Eleven rear pigtails were replaced due to excessive corrosion or being misshaped.

D. Improvement Experience

1. Rate of Power Rise - CG-806 - Began installation of thermocouple wiring and equipment.

2. CG-791 - Confinement of Radioactive Particles in 105 Building Exhaust Air - Installation of rear face piping was started.

3. CG-817 - Crossheader Differential Pressure Measurement - Began installation of pressure gage system on front face.

E. Radiation Monitoring Activities - No lapses of radiation control were incurred by F Reactor Operation this month. The maximum dose rate to personnel was 2 r/hour during initial shutdown entry to the discharge area. The source of radiation was corrected after being identified as a dummy element caught in the rear ball valve of a PCCF tube. The experimental level remained on a restricted status as addition of external shielding proved only partially successful in reducing neutron beams from "A" hole and "D" hole facilities, with neutron dose rates up to 100 mrem/hour, uncorrected for source size being measured. Personal contamination during the month was limited to the detection of three cases of shoe contamination following radiation zone work.

F POWER OPERATION

A. Operating Activities - Earth tremors were noted at 10:40, 10:43, 10:48, and 11:23 p.m. on August 17 and at 7:30 and 7:40 a.m. on August 18. No operating equipment was effected. The eight process water pump operation in 190-A Building continued throughout the period.

A disturbance on the BPA Electrical System, caused by governor trouble at McNary Dam, resulted in low frequency at 12:52 and 1:26 p.m. on August 27. No equipment was effected.

B. Equipment Experience - The refractory replacement and repair work on No. 2 boiler was completed and the unit placed in service. Third party inspection of No. 1 boiler was completed. The nylon drive key for main lubricating oil pump on No. 8A pump unit was inspected. No noticeable change was evident in the wear on this key since reinstallation on July 21. The 24 inch Chapman Cone Valve damaged during CG-558 Acceptance Tests was repaired and will be used as a spare.

C. Improvement Experience

MJA-17-190 Air Conditioning Unit Repairs - Work is 100 percent complete.

182 FA - Pump Test Stand - The tie-in of 6 inch piping to the raw water export header in 182 Building was completed. Over-all work is approximately 75 percent completed.

CGI-791 - Reactor Containment Program - Phase II-A - Project work continued; the sensing line from the west 105 water storage tank to the Groves valve was relocated.

Outside Dichromate Storage Facilities - 190-F - The first shipment of liquid dichromate was transferred to the outside storage tank. The second transfer pump in the 185 Building was moved to the 190 tank room.

F MAINTENANCE OPERATION

A. Equipment Experience

1. Instruments - During the August 21 reactor outage, the first panel of the Panellit board was inspected for leaks. One leaking gage was replaced.

   Twenty-five rear face reactor thermocouples were repaired.

2. Electrical - A class "A" overhaul was completed on the reactor building work area cranes. In addition, load limit switches were installed.

3. Mechanical - During the reactor outage of August 6, four rear face boots were replaced (0571, 1371, 1374, and 3971).

   The 115 helium compressor was removed from service during repairs and replacement of a blown gasket on the third stage.

   Work was started on replacement of the 110 gas lines supporting poles.

B. Maintenance Engineering

1. Instrument Engineering

   105 Graphite Stringers - All materials for assembly of the test stringer (DT-IP-26-0) are on plant with the thermocouples presently being swaged in 300 Area. Delivery of alloy wire for thermocouples has been delayed for approximately two weeks.

2. Electrical Engineering

   105 Building Transfer Area Crane Revision - A new drawing is being prepared to show As-Built status per D.C. #191-F (Dwg. No. H-1-12069).

3. Mechanical Engineering

   105 Fan Room Storage - The Plant Engineering Operation provided a proposed plan and cost estimate for removal of the Blue Tool Room from the work area and cutting doorways through the connecting walls of the exhaust fan rooms in order to utilize space in fan rooms #9 and #10 for metal storage.

   Reinforcing Floor Grating - Far Work Area Door, 105-F - Work was initiated to reinforce the floor grating at the far work area door in order that metal may be unloaded at this location.

C. Planning and Scheduling

1. Property Control - One property disposal request was issued to cover the burial of a rotometer, gage, and recorder from the outlet gas system at 115.

2. Approximately 27 percent of available manpower was assigned to Productive Maintenance work. There were 13 class "A" overhauls and 256 class "B" overhauls completed.

D. Events Influencing Costs

In maintaining the F Reactor facilities, a total of 499.3 nonexempt overtime hours and 47 exempt overtime hours was required.

MANAGER
F REACTOR OPERATION

CN Gross:GBJ:det

H REACTOR OPERATION

August, 1959

I. ORGANIZATION AND FUNCTIONS

No change.

II. PERSONNEL

A. Force Summary

	July 31			August 31			Net Change
	E	NE	Total	E	NE	Total	Of Total
General	3	2	5	3	1	4	-1
Processing	16	37	53	16	36	52	-1
Power	8	51	59	8	51	59	0
Maintenance	14	60	74	15	61	76	+2
Central Maintenance	18	110	128	18	114	132	+4
Total	59	260	319	60	263	323	+4

B. Movement of People

Exempt personnel movements consisted of the transfer of W. D. Richmond, H Reactor Manager, to 100-D-DR Reactor Operation, replaced by E. J. Filip, former Manager, 100-KW Processing Operation, and the transfer of B. T. Rossiter to H Maintenance Operation as Assignment Supervisor from the Community Operation.

Nonexempt personnel movements consisted of one new hire, ten transfers in and seven transfers out.

III. PERSONNEL ACTIVITIES

Nothing significant to report.

IV. SAFETY AND SECURITY

There were no disabling injuries or security violations during the month. There were 18 medical treatment injuries reported. A radiation incident occurred during the attempted removal of a step plug from Y hole in 105-H Building. Six people were exposed to dose rates of 5 r/hr and contamination was spread to surrounding non-radiation zones with skin contamination to four people and personal clothing contamination to six people. The assembly was pushed back into the reactor when the dose rate reached an intolerable level. All cases of skin and clothing contamination were completely decontaminated.

V. NONROUTINE REPORTS

None.

VI. COMPONENT ACTIVITIES

General

A. Administrative Activities

Routine during the month.

B. Personnel Development

Nothing significant to report.

C. Cost Control Activities

Routine during the month.

D. Landlord Activities

Vending machines for candy and cigarettes were installed in the following buildings: 1701-H, 1704-H, 1717-H, 1761-H, 105-H, and 190-H.

E. Suggestion Evaluation

On hand at the beginning of the month - 23; received - 9; evaluated and returned - 4; on hand at end of month - 28.

Processing Operation

A. Production

Input production was 11.3 per cent above forecast. Equilibrium power levels reached 1580 MW and were governed by administrative operating limits for rupture control.

B. Operating Experience

1. Operating Continuity

The operating continuity of the H Reactor was affected by the events listed below:

Date	Hours	Reason
1	87.8	Shut down for enriched solid rupture in 3395. Outage extended for leak testing, project work, and tube replacement.
5	0.2	Panellit trip during start-up.
10	32.7	Shut down for water leak in 0279.
21	30.9	Shut down for I & E natural rupture and water leak in 3790.

2. Equipment Experience

a. Process Tubes

Seventeen process tubes were replaced. Four second generation tubes which had been in the reactor for three years were removed for examination to determine the corrosion pattern, which proved to be uniform top to bottom corrosion.

Two tube leaks were experienced; one the result of a ruptured fuel element, and the other a pin hole leak in a 63-S tube.

Forty-nine tubes were probologged.

b. Panellit System

Ninety-two additional 10-90 range gauges were installed bringing the precentage of this type gauge to 39.

C. Improvement Experience

All rear face installation work for Project CG-666, Zone Temperature Monitoring, was completed leaving only tie-in to control room instrumentation to complete the project.

D. Radiation Experience

See IV, Safety and Security.

D. Events Influencing Costs

There were 104 hours of overtime worked during the month.

Power Operation

A. Operating Experience

Average steam generating rate was 68,700 pounds per hour. An evaporation rate of 6.98 pounds of steam per pound of coal was attained using approximately 78.6 per cent pit coal.

At approximately 10:40 PM on August 17, earthquake tremors were observed throughout the water plant building. However, no damage resulted. The water level in the 190 storage tanks fluctuated approximately 0.3 foot.

Critical power conditions, "extended W", were in effect from Monday through Friday for weeks starting August 10, 17, and 31 to permit overhaul of 230 KV breakers at 151 Building.

Vibration tests were made on the emergency generator at Building 184 and the vibration was reduced by reducing the lubricating oil pressure and other miscellaneous adjustments. It was observed, however, that practically all stator coils are loose and a rewedge job will be required. Plans are underway to complete this work during an extended outage in September.

Standard quality water was produced throughout the month with an average alum feed of 6.9 ppm. Separan feed was discontinued on August 4.

B. Equipment Experience

Sludge was removed from all area septic tanks during the week of August 24. A B inspection was made to the traveling screens in 181-H Building. A B inspection was completed on Nos. 2 and 3 export water pumps, and an A inspection was made on No. 4 condenser water pump motor in 182-H Building. The agitator paddle was removed from No. 2 mixer on August 4 since the shaft was badly corroded from sulfuric acid. It is not planned to replace the paddle since adequate mixing is created by a high velocity water flow. Sedimentation basins Nos. 1 through 5 were cleaned during the month. Inspections of Nos. 1 through 7 flocculator lubricators will be scheduled when replacement parts are available. A ruptured diaphragm was replaced in No. 8 filter controller. All filter controllers were adjusted to a three inch cable travel in order that uniform flow rates will be attained. We are currently controlling the filter flow on both sides with one master controller. An improved design coil was installed in all 190-H annex pump unit 41-X relays. Experimental geared oil pump drive keys were installed in Nos. 3 and 7 annex pump units on August 11. "Delrin" (DuPont Company) and "Lexan" (G.E. Company) plastic keys were installed in Nos. 7 and 3 units, respectively. On August 16, the key in No. 3 unit failed necessitating use of the auxiliary oil pump. However, a subsequent examination of the key in No. 7 unit indicated little, if any, wear. The portable oil centrifuge pump provided standby backup for the auxiliary oil pump on No. 3 unit until repairs could be made. The butterfly valves on all steam turbine pumps were inspected.

C. Events Influencing Costs

Overtime consisted of 16 hours exempt, 24 hours nonexempt scheduled, 28.5 hours lunch relief, and 21.6 hours safety meeting.

Maintenance Operation

A. Field Maintenance

The far downcomer was inspected and found to be in satisfactory condition. The dip-tube water-level instrumentation installation was completed within the downcomer.

The VSR tip container was filled with Magnetite for shielding.

Thirty-five rear face J-type pigtails were replaced during the month to correct leaks.

The shielding framework and lead filler for KAPL 120 was fabricated and completed this month. The shielding is designed with removable sections to repair loop piping and instrumentation.

The Panellit system was checked for response to pressure change. There were 101 gauges slow to respond. The oil was drained from these gauges and replaced with new oil; also, lines from gauges to the valve rack were flushed.

There were 28 rear face thermocouples repaired during the month.

Two near sample room copper tube lines ruptured in the cooling water trough. Repairs were impossible; therefore, temporary lines and heat exchangers were installed for use until the permanent replacement of all the sample lines.

The 105 Building transfer area crane motor was Class A inspected and repaired. The motor rotor shaft was found to be cracked at the keyway for the magnetic brake drum and was near failure. The rotor was sent off-plant for replacement of the shaft and necessary repair.

B. Engineering

A prototype horizontal control rod seal was received, tested, and found to be unsatisfactory because of a metal-to-rubber bond failure. Another seal, incorporating a different bonding technique, is being prepared and if satisfactory, will be used for all HCR's. Purchase requisitions were prepared for valves, pressure gauges, pressure regulators and flowrators, which will be used for seal pressure control.

Reactor Power Calculating System maintenance procedures have been prepared in rough-draft form and issued to Instrument Maintenance engineers for comment.

Gamma Monitor Heat Exchanger and required piping design is completed and approved. Specifications have been prepared for required equipment.

A new approach was taken toward providing less expensive facilities for decontamination and servicing of rear face caps. Sketches of most of the proposed installation have been completed and a report will be issued when all cost estimates are received for the various components. This facility will be located in the existing 30' ready room.

Central Maintenance Operation

A. Engineering and Planning

A review of tube removal tool problems and general progress was held with all Maintenance Managers and their respective specialists and schedulers. The proposed program for reviewing the present method of scheduling work in connection with painting, was accepted by B, K and F Areas in its entirety. As a result of this acceptance, work was started in K along the lines of the new program which essentially constitutes a program based upon scheduling work for the fiscal year.

The quick coupling used with tube removal tools has been redesigned to afford greater strength and cheaper fabrication.

B. Shops

The hot shop repaired the following: 85 splitters, 34 broaches, 12 nozzles, 800 venturis, and 1,220 caps. Fabrication work was performed in all shops in connection with Projects CG-706, CG-707, CG-806, CG-817 and MJA-8. Ball 3X drop test equipment was fabricated as were special lead chambers for 183-B. Special graphite bearings were machined for 1706-KER, rear face pad

screens were fabricated for D and B, 38 probe assemblies were fabricated for irradiation testing. Assembly and calibration of Panellit gauges was performed. The Elmo decontamination loop and transfer casks for 1706-KER and C were completed. Special equipment to be used in connection with traverse readings of reactor tube channels and tools required in connection with tube removal were fabricated.

C. Projects and Special Services

Projects active in the field for the month were: CG-666 in H; CG-706 in B, C, DR, H and KE; CG-806 in KE, F and D; CG-817 in B, D, F, H, KE and KW. Painting activities for this month completed the quarterly schedule in D-DR and started this quarter's schedule in KE-KW. All load luggers in IPD were repainted. Installation work in connection with Design Test 1052 was completed. Rear face pad screens for B and D were installed. Revisions, as well as maintenance work in connection with the charge-discharge equipment at 105-C were continued. Installations of the flash over protection for 10,000 HP lift pump motors in K were started.

E. J. Filip
Manager
H REACTOR OPERATION

EJ Filip:GVC:bf

KE-KW REACTOR OPERATION
MONTHLY REPORT
AUGUST, 1959

I. ORGNAIZATION AND FUNCTIONS

No change

II. PERSONNEL

A. Force Summary

	July 31			August 31			Net Change of
	E	NE	Total	E	NE	Total	Total
General	4	2	6	4	2	6	0
KE Processing Oper.	15	42	57	16	42	58	+1
KW Processing Oper.	15	39	54	14	39	53	-1
Power Oper.	11	72	83	11	72	83	0
Maintenance Oper.	25	123	148	25	124	149	+1
Supp. Crews Oper.	10	57	67	10	56	66	-1
TOTALS	80	335	415	80	335	415	0

B. Movement of People

Within KE KW Reactor Operation, M. L. Faught, Facilities Engineering Section, was temporarily assigned Acting Supervisor, Maintenance Engineering, Vice, L. P. Reinig who was placed on temporary assignment with Facilities Engineering Section. E. J. Filip, Manager, KW Processing, was appointed Manager, H Reactor Operation. J. P. McBride, Supervisor 100 Operations, KE Processing was transferred to D Processing, D-DR Reactor Operation. R. M. Micklich, Programmer, Production Operation, was transferred to KE Processing as Specialist, Reactor Operation. R. E. Slater, Finished Products Operation, CPD, was transferred into KE Processing as Analyst, Radiation Monitoring. One Technical Graduate and one Summer Program Hire were assigned at month end.

Changes for the month include four transfers in and three transfers out and one termination.

III. PERSONNEL ACTIVITIES

John Smith, Specialist, Lighting of General Electric Properties, Large Lamp Department, made an inspection of 105 building lighting facilities on August 5.

John Cronin of Travelers Insurance Company made a third-party inspection of a number of air receivers and unfired pressure vessels in the area.

The third class of N. S. Savannah trainees arrived on August 3 and completed their training on August 21.

IV. SAFETY AND SECURITY

Eleven medical treatment injuries were experienced.

The safety program material developed by the K Plant Safety Council for emphasis during the month was related to vacation safety. Three films stressing safety while on vacations were shown and a folder listing vacation safety aids together with travel log was furnished to personnel leaving on vacations during the month. Members from "A" Shift completed their term on the Council.

No security violations were incurred.

V. NON-ROUTINE REPORTS

None

VI. FUNCTIONAL ACTIVITIES

GENERAL

A. Administration

During August the HOO-AEC Labor Standards Board approved seven jobs for assignment to plant forces which are estimated to cost $18,412.83. Since the procedure for obtaining LSB approval was initiated in IPD, 170 jobs have been approved, representing a total cost of $7,787,103.49.

Suggestion Plan Statistics for the month were as follows:

Suggestions at start of month --	65
Received for evaluation --------	12
Replies submitted -------------	16
On hand at end of month --------	61

A program was carried out to enroll eligible employees in the Savings and Security Program. The resulting participation level is 100 per cent.

B. Cost Activities

An audit of time card codes was initiated, and corrections were made where customer codes were not consistent with current work assignments.

Assistance was given to Pat Cabell in establishing the K Maintenance cost trend curves for purposes of long range cost planning.

At the Monthly Cost meeting, cost reduction programs for FY-1960 were outlined by the various operations based on the requirements of the IPD Savings and Improvement Report.

A graphic report was issued showing actual expenditures to date as compared to CY-1959 actual costs.

C. Landlord Activities

Revisions in plant telephone listings were submitted for use in preparing the fall directory.

Arrangements were made to have Project Engineering representatives proceed with proposal activity to authorize relocation of the K exclusion area perimeter fence.

Final arrangements were made to provide service connections for installation of vending machines.

Seven excavation and core drilling permits were issued.

KE PROCESSING OPERATION

A. Production

Input production was 109.1 per cent of forecast. Power level was limited by rupture control tube limits.

B. Operation Experience

1. Operating Continuity

Reactor outages totaled 122.8 hours. Operating continuity was affected by the following events:

Day	Hours	Remarks
1	0.4	Reactor down at start of month for poison discharge.
24	80.9	Scheduled metal processing outage. Removed ruptured slug from tube 2384.
29	0.5	Panellit scram - cause unknown.
29	41.0	Reactor shut down due to lack of heat control following scram recovery. Start-up delayed by stuck tube.

2. Equipment Experience

a. Instrument and Circuitry - Two Beckman trips occurred, one due to a faulty amplifier and one due to controller failure. Eight gages were changed out due to leaking Bourdon tubes or leaks on the capillary connections. Frequency of gage inspection during operation was increased. The gamma monitor system was out of service for several hours due to relay contact and wiring connection problems and a correction program was initiated. The seismocope high sensitivity alarm was activated during the earth tremors which occurred on August 17. All seismoscope trips were subsequently recalibrated.

b. Process Water System - One rear crossheader expansion joint failed and was replaced on August 24. A significant increase in Panellit pressure with a proportional decrease in total flow occurred at two periods during the month due to film formation on the tubes and charges. The film formation was arrested in each case by an increase in alum feed to the process water. More than 1,000 Panellit gages were rolled to compensate for the pressure changes to avoid scramming the reactor.

c. Graphite Stack Distortion Measurements - The graphite stack motion measurement device was installed in 3-B test hole. Vertical traverse measurements were made of Z-3 channel and borescope inspections were made in channel of 3-B test hole and four process tube channels.

d. Ruptures - One fuel element failure in tube 2384 was detected and discharged during the scheduled outage. A second rupture suspect in tube 5455, was not confirmed by month end. All rupture-prone metal was discharged except for six tubes which are scheduled out at low concentrations.

C. Improvement Experience

1. Production and Process Tests

Material of IP-266-A, the seven rod enriched cluster elements with 20 and 30 mil Zircaloy-2 jackets, was charged into KER Loop 1.

D. Radiation Experience

There were two Lapses of Radiation Control.

The maximum personnel dose rate to complete graphite stringer removal was 5 r/hr. A dose rate of 40 r/hr was measured on the vacuum pump during removal operations. During rupture removal operation, personnel dose rates of 3 r/hr were required for placement of quickie equipment on the tube.

KW PROCESSING OPERATION

A. Production

Input production was 118.9 per cent of forecast. A new high monthly production record was achieved. Maximum power level was limited by the planned power increase program. The twenty-day operating period was made possible by excellent control techniques, the use of solid poison splines for long term reactivity gains control, and the absence of equipment failures.

B. Operating Experience

1. Operating Continuity

Reactor outages totaled 62.1 hours. Operating continuity was affected by the following events:

Cf-4

Day	Hours	
8	46.5	Reactor was shut down when lower half of temperature monitor failed to function and affected tube temperatures could not be obtained by portable instrumentation.
31	15.6	Scheduled outage for metal proceessing. The outage was in progress at month end.

2. Equipment Experience

a. Instruments and Circuitry - The exact cause of the temperature monitor failure that deactivated the lower half of the system could not be determined. Three inoperative RTD circuits were repaired and returned to operation. Nine RTD's remained inoperative at month end. A faulty cancelling switch in 2-R turret of the gamma monitor caused some monitored points to indicate full scale reading. The system was repaired.

Indications of earthquake tremors were observed on the seismoscope and galvanometers on August 17. The reactor was thoroughly checked for possible damage, and none was found.

C. Improvement Experience

1. Production and Process Tests

Fog spray equipment was scheduled for installation during the September portion of the August 31 outage under CG-791, Reactor Confinement, Phase 1.

D. Radiation Experience

There were no Lapses of Radiation Control.

During routine decontamination and sorting of dummies, a fragment of irradiated metal was found in a bucket. A dose rate of 3.5 r/hr was measured through two feet of water. Spline operations were conducted at a maximum dose rate of 2.5 r/hr to personnel.

Several cask cars received from CPD were found contaminated to a maximum of 100,000 c/m and 90 mr/hr. Appropriate action was taken and subsequent shipments were within established limits.

KE-KW POWER OPERATION

A. Operating Experience

1. IT4 Transformer Failure - 151-KE

When attempting to start the Number 5 and 6 river pumps at about 4:00 p.m. on August 27 in conjunction with a routine reactor startup, both pumps relayed out through the unbalanced current relay. The cause was a fault in the IT4 - 4160V transformer supplying this bus (bus D). The transformer breaker was opened to isolate IT4 transformer from bus D. The tie breaker between bus C and D was closed to energize bus D from IT3 to

permit starting of the river pumps. Startup of KE Reactor was delayed 0.8 hours. Investigation by Electrical Distribution revealed a malfunction of the voltage tap change mechanism. Repairs were completed and the system was returned to normal service on August 28.

2. Sulfuric Acid Feed Failure - 183-KE

Plugging of the acid feed line between the storage tanks and the 183-KE head tank interrupted the feeding of acid for approximately seven hours while the necessary repairs were made. Water quality was maintained with additional chlorine and alum during the interim period.

3. Electrical Peak Control Efforts

The HAPO electrical load for August was controlled at 327.0 megawatts until August 12. Excess generator loading at this control point (4.0 megawatts on August 11 and 12) made revision of the electrical control point upward to 331.0 megawatts advisable for the remainder of the month. Maximum generation required at the 331.0 megawatt control point was 2.5 megawatts on August 20. Excess generator loading to control the peak was required for approximately 74 hours total during the month.

B. Equipment Experience

A water leak on the motor air cooler of the Number 2 181-KW river pump was detected during a routine check. The unit was subsequently removed from service for seven hours to permit replacement of the faulty tube.

A water leak on the flywheel cooler of the Number 6 KE high lift unit necessitated repair. Use of the recently installed sectionalized valves in the cooling lines permitted the installation of a replacement coil without shut down of the pumping unit as would have previously been required.

C. Improvement Experience

1. CG-775 K Water Plant Expansion

The Number 1 prototype pumping set at 190-KE was dismantled during the August 24 to 26 outage to permit inspection by the vendor and engineering personnel. Although there was no evidence of cavitation damage in the primary unit, the impeller of the secondary pumping unit showed cavitation in excess of that permitted by the specifications. Byron-Jackson personnel were called in to evaluate the evidence and to propose a corrective measure for the secondary impeller. The pumping set was returned to normal service on August 27.

2. Clearwell Inspection - West Half - 183-KE

The west half of the 183-KE clearwell was pumped down and visually inspected. The pumpwell sluice gate screens, found to be about 60 per cent plugged with alum residue, were scrubbed and cleaned. Considerable

sand build-up was found both in the clearwell and effluent flume. A future inspection of this clearwell was planned to determine if the sand carry-over is a result of the high filter flow rate test program in progress at 183-KE.

KE-KW MAINTENANCE OPERATION

A. Equipment Experience

1. Instruments

Range changes and checks were made to 3,379 gages. Oil was placed in 114 sensing lines in 105-KW.

The step plug and recorder of the graphite motion monitor were installed in 105-KE. The recorder was calibrated to give a graphite motion indication of the plus or minus one inch.

2. Electrical

a. "C" Elevator Hoists - The larger capacity metal hoist was installed in 105-KW. Installation of associated safety devices was completed in both 105 buildings thereby completing the new hoist installation and the recommendations of IPD Serious Accident Investigation Number 59-6.

b. Control Room Lighting - Installation of new lighting over the console in 105-KE was completed.

3. Mechanical

a. Graphite Stringer - 105-KE - Stringer number RS-1 was removed. Plans were made to install a new stringer at a later date.

b. Process Pump - 190-KE - Number 1 high lift and low lift pumps were dismantled to determine the extent of cavitation.

c. Metal Handling Equipment - A magazine conveyor was installed in 105-KW in accordance with recommendations of Maintenance Engineering.

d. Chemical Feed System - 183-KE-KW - Modifications to the alum feed system were completed to allow alum feed into each header rather than into each flashmixer basin. The change eliminated a number of feeders and is expected to effect improved control of alum feed.

B. Engineering

1. The following design changes were routed for approvals:

a. Design Change 316 - Safety Circuit Trip Removal - A change to delete temperature monitor and Number 5 Beckman trips from the safety circuit.

b. Design Change 314 - Temporary Scram Discriminator - A change to provide safety circuit trip identification among 13 components of the safety system and to give positive identification of the component initiating the scram.

c. Design Change 312 - Charging machine interlock bypass.

2. 1706-KER Safety Circuit Study

The final draft of HW-6076, "A Study of 1706-KE and KER Equipment Reliability As It Effects Safety and Operation of the KE Reactor" was completed.

3. The following drawings were completed for the Electrical Manual:

a. Fire-eye electronic network, drawing and test data.

b. Electrical drawing, 105-KW metal storage room door operator.

4. The following PM electrical procedures and check sheets were completed:

a. HCR control room equipment controllers, bypass switches and Selsyn receivers.

b. HCR control relays and wiring in normal and emergency equipment cabinets of Number 3 electrical equipment room.

C. Planning and Scheduling

1. Class "A" overhauls were completed on 181 items of equipment and Class "B" on 234 items.

SUPPLEMENTAL CREWS OPERATION

A. Events Influencing Costs

The non-exempt time distribution from August 2 through August 30 was as follows:

Area	Percent	Hours	Area	Percent	Hours
100-B	15.60	1205	100-F	9.15	706
100-C	11.05	854	100-H	14.26	1100
100-D	19.70	1526	100-KE	15.21	1174
100-DR	6.31	486	100-KW	8.72	674

Manager
KE-KW REACTOR OPERATION

RSB:GEG:ced

Cf-8

PRODUCTION OPERATION
AUGUST, 1959

I. ORGANIZATION AND FUNCTIONS

No change.

II. PERSONNEL

A. Force Summary

	July 31			August 31			Net
	Ex.	N.E.	Total	Ex.	N.E.	Total	Change
General	2	1	3	2	1	3	0
Prod'n Rpts. & Statistics	1	2	3	1	2	3	0
Prod'n Planning and Sched'g	5	4	9	5	4	9	0
Prod'n Computing	3	3	6	2	3	5	-1
Essential Materials	1	1	2	1	1	2	0
	12	11	23	11	11	22	-1

R. M. Micklich, Programmer, transferred on August 17 to KE Processing Operation.

III. PERSONNEL ACTIVITIES

On August 25 all personnel of the Production Operation participated in an information meeting featuring reactor-related films made available by the AEC-HOO.

IV. SAFETY AND SECURITY

There were no injuries or security violations. Safety and security meetings were attended as scheduled.

V. NON-ROUTINE REPORTS

None issued.

VI. FUNCTIONAL ACTIVITIES

A. Production Planning and Scheduling Operation

1. Production Scheduling

a. Discharge Concentrations

Four discharge concentration reductions were effected during August to bring exposure goals more closely into line with inlet water temperature, power levels, and water flow. These reductions involved I and E regular slugs as listed.

a) B-DR-H Reduced from a nominal 725 MWD/Ton to 700 MWD/Ton.

b) KW Reduced from a nominal 700 MWD/Ton to 650 MWD/Ton.

The amount of material discharged outside the established goal plan was the lowest for any month of this year. The amounts involved are as follows:

Below Goal Discharging - August 1959

Reactor	Tons Disch.	Tons Excess Usage	Material Type	Reason
D	2.0	0.8	Regular	Tube replacement
DR	0.8	0.4	Regular	Tube replacement and leakers
KE	2.1	0.4	Regular	To charge enrichment
	1.9	0.5	Regular	Tube replacement
	0.6	0.3	Regular	Tube replacement
KW	0.8	0.4	Regular	Temporary poison
	8.2	2.8	Totals for Regular	

The following is a comparison of the August discharge exposures for each metal type with those of previous months.

	Regular U		Enriched U	
	Solid	I & E	Solid	I & E
June	704	697	761	690
July	727	728	1068	693
August	757	743	953	824

b. Process Tube Replacements

During August process tubes were replaced at five reactors. Replacements were accomplished at B, D, DR, H and KE Reactors with 7, 17, 9, 17 and 4 (total 54) tubes, respectively

2. Operations Analysis

Work continued on review of major problem areas, compilation and reorganization of production data, tube corrosion, tube replacement, and reactor outage data.

B. Production Computing Operation

Tube-by-tube source data were processed to establish the current production and corrosion status for each tube in all reactors. Routine and emergency reports were issued to implement the scheduling, forecasting, and accountability functions of the Production Operation. Charge-discharge and tube replacement information for each reactor operation was provided in accordance with production schedules. Production data were supplied to each Pile Physicist for reactivity evaluations, and to Process Technology for EDPM processing.

Individual tube source data were supplied to the SS Accountability Operation for calculating weights of SS material in discharges and month's end in reactor inventories.

In August PCO calculated and set up as part of the routine records for each process tube a production factor averaged over a definite period of time. The calculation makes available for special applications an average factor for the preceding year. At present the number is being used for making forecasts of process tube corrosion.

C. Production Reports & Statistics

Routine processing of the Daily Production and Daily Operations Reports and the monthly Combined Report of Production and Reactor Operations was continued. Data involving reactor operation and associated equipment were collected and tabulated in historical record books. A chart book was maintained for the HAPO General Manager and a large volume of both routine and non-routine data were supplied to IPD personnel. Some routine data were also supplied to the FPD, CPD and HLO.

D. Essential Materials

Rail and truck shipments received in August were as follows:

Carload shipments for IPD	91
Carload shipments for other Depts.	24
Truck shipments for IPD	160
Total	275

Helium consumption during the month of August for all reactors was as follows:

100-B	266,000 cu. ft.
100-C	326,000 cu. ft.
100-D	225,000 cu. ft.
100-DR	239,000 cu. ft.
100-F	122,000 cu. ft.
100-H	152,000 cu. ft.
100-KE	288,000 cu. ft.
100-KW	368,000 cu. ft.
Total	1,986,000 cu. ft.

In addition to the routine duties involved in the procurement and delivery of essential materials, the following items were included in the group's activities during August:

1. A new method of transporting liquid sodium dichromate was begun on a trial basis with the arrival in Pasco of 650 tons on August 12. The material was shipped in bulk by ocean freighter from Baltimore to Portland, transferred at Portland to barges of the Tidewater - Shaver Navigation Co., and towed to their Snake River Terminal at Pasco. From Pasco the material was delivered to IPD's storage tanks by tank truck. A substantial savings in freight costs may be realized by the continued use of water transportation.

2. Arranged for 300 tons of Northern Pacific Coal to be test burned in the 100-D, 200-East and 700 Area boiler houses. Following these tests Purchasing was notified that the coal would be accepted but for the time being would be used only in the 200 Area boilers.

E. Miscellaneous Activities

Security classification matters continued to be handled for the department. New guidance from the AEC-HOO and the Hanford Laboratories Operation was given appropriate distribution and interpretation within IPD. Special liaison with HLO continued in connection with revision of the Hanford Classification Guide as required by AEC action (1) downgrading certain Hanford production data from Top Secret to Secret, and (2) establishing new Guide topics covering New Production Reactor information.

Contact was maintained with KE Processing, Contract Administration, and the AEC-HOO regarding the N. S. Savannah Training Program. The third (and last) scheduled group arrived on August 3 and completed its Hanford stay on August 28. The four men involved represented oil and shipbuilding companies, and the U. S. Merchant Marine Academy.

Preliminary planning was essentially completed for supplementing the in-service training given reactor Utility Operators with classroom sessions in reactor fundamentals conducted by the Operational Physics component of the Research & Engineering Operation.

Manufacturing Operation liaison with O. S. Hulley, Consultant - Manufacturing Education & Training in General Electric's New York Office, was initiated in connection with the plan for his visit here in early October.

Assistance was given the AEC-HOO with the touring of nine U. S. Navy reactor engineers through representative IPD production and development facilities on August 25.

C. A. Priode, Manager
Production Operation

CAP:DLD:bam

MONTH August, 1959	REACTOR OPERATIONS STATISTICS — PROCESSING																	
	B		C		D		DR		F		H		KE		KW		TOTAL	
INPUT PROD.–Pu (% OF FORECAST)	110.0		117.4		102.3		116.9		120.8		111.3		109.1		118.9		113.5	
TIME OPER. EFF. (% OVERALL)	77.5		83.5		83.0		89.9		87.7		79.6		83.5		91.7		84.5	
NO.OF REACTOR OUTAGES & HOURS	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.	NO.	HRS.
SCHEDULED	1	162.8	2	109.8	1	111.0	0	48.3	0	64.7	0	92.1	1	73.4	1	46.3	6	708.4
UNSCHEDULED – SCRAMS	1	0.4	1	0.6	0	-	1	0.3	1	7.7	1	0.2	1	0.5	0	--	6	9.7
– OTHER	1	4.4	0	12.0	1	15.8	1	26.4	1	19.4	3	59.3	1	48.9	1	15.8	9	202.0
TOTAL	3	167.6	3	122.4	2	126.8	2	75.0	2	91.8	4	151.6	3	122.8	2	62.1	21	920.1
BREAKD'N OF REACTOR OTGE HRS.																	TOTAL HRS.	TIME
PLANNED																		
CHARGE–DISCHARGE	38.4		61.1		43.7		26.4		15.6		33.4		58.4		44.6		321.6	5.4
TUBE REPLACEMENT	16.3		0		14.0		11.3		7.1		19.8		0		0		68.5	1.1
PROJECT WORK	21.0		15.5		1.0		0		13.2		0		0		0		50.7	0.9
PRODUCTION TEST	6.6		8.5		3.1		0		0		0		1.5		0		19.7	0.3
MAINTENANCE	80.5		24.7		49.2		10.6		28.8		38.9		13.5		1.7		247.9	4.2
MISCELLANEOUS	0		0		0		0		0		0		0		0		0	0
SUB – TOTAL	162.8		109.8		111.0		48.3		64.7		92.1		73.4		46.3		708.4	11.9
UNPLANNED																		
CHARGE – DISCHARGE	0		1)12.0		1) 2.9		1) 0.5		1)11.2		0		2)16.5		0		43.1	0.7
PRODUCTION TEST	0		0		0		0		0		0		0.4		0		0.4	0
RUPTURE REMOVAL	0		0		0		0		8.2		17.4		3.2		0		28.8	0.5
WATER LEAK	0		0		12.9		25.9		0		36.4		0		0		75.2	1.3
MAINTENANCE	4.4		0		0		0		7.7		5.5		3) 22.6		15.8		56.0	1.0
INSTRUMENTATION	0		0		0		0		0		0		0		0		0	0
PANELLIT	0.4		0.6		0		0.3		0		0.2		0.5		0		2.0	0
MISCELLANEOUS	0		0		0		0		0		0		6.2		0		6.2	0.1
SUB – TOTAL	4.8		12.6		15.8		26.7		27.1		59.5		49.4		15.8		211.7	3.6
TOTAL	167.6		122.4		126.8		75.0		91.8		151.6		122.8		62.1		920.1	15.5
NO.SLUG RUPT. (ALL TYPES)	0		0		0		0		1		2		1		0		4	
NO.NEW TUBES INSTALLED	7		0		17		9		0		17		4		0		54	
TYPE OF WATER LEAK – TUBE	0		0		1		3		0		2		0		0		6	
VAN STONE	0		0		0		0		0		0		0		0		0	

REMARKS:

(1) Stuck charges.
(2) Stuck spline.
(3) Includes 17.5 hrs. for removal of a stuck tube.

Ch-1

MONTH: August 1959

REACTOR OPERATION STATISTICS – SLUG RUPTURES

TYPE MATERIAL	TUBE NO.	TYPE RUPTURE	REMOV HRS.	CHARGE DATE	RUPTURE DATE	ACT. CONC.	LOT NO.	REMOVAL METHOD				REMARKS
								QUIC.	CHG. MACH.	HYD. JACK	TUBE PIECE	
Solid E	3395-H	Split	1.8	1-4-59	8-1-59	946	KE-055A		X			
I&E Reg.	2453-F	Side-Other	8.2	11-8-58	8-21-59	886	CL-007C				X	
I&E Reg.	3790-H	Unknown	15.6	4-28-59	8-21-59	727	KL-188D				X	Tube Leak
I&E Reg.	2384-KE	Unknown	3.2	3-24-59	8-24-59	817	SK-057D			X		

Ch-2

BM-5000- (12-58) AEC-GE RICHLAND, WASH.

MONTH: August, 1959

REACTOR OPERATIONS STATISTICS — POWER

SHEET 1

		100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW	TOTAL
RIVER WATER (BLDG.181)										
TO RESERVOIR (BLDG.182)	GPM AVG.	15326		5301		2350	3314	-	-	26291
TO FILTER PLANT (BLDG.183)	GPM AVG.	61222		88735		80656	75700	158100	175800	640213
TO FILTER PLANT (C&DR)	GPM AVG.	102961		62887						165848
TO R & E (KER) & FEO	GPM AVG.			203				577		780
TOTAL	GPM AVG.	179509		157126		83006	79014	158677	175800	833132
TOTAL	M GAL.	8013.3		7014.1		3705.4	3527.2	7083.3	7847.7	37191.0
RESERVOIR WATER (BLDG.182)										
TO POWER HOUSE (BLDG.184)	GPM AVG.	25		61		336	47			469
TO COND.SYSTEM(BLDG.190)	GPM AVG.	3000		1562		1722	3267			9551
TO COND.SYSTEM (190DR & 183F)	GPM AVG.			2622		292				2914
TO EXPORT SYSTEM	GPM AVG.	12301		1056		0	0			13357
TOTAL	M GAL.	684.2		236.6		104.9	147.9			1173.6
FILTER WATER (BLDG. 183)										
TO POWER HOUSE (BLDG.184)	GPM AVG.	225		223		155	180			783
TO PROCESS (BLDG. 190)	GPM AVG.	64996	80229	74435	73587	77514	70300	153223	170759	765043
TO 108	GPM AVG.	3500	6800	209		1180	1230			12919
TO 108DR	GPM AVG.			210						210
TO FILTER PLANT (BLDG. 183DR & B)	GPM AVG.		11294	11664						(22958)
TO F & S SYSTEM	GPM AVG.	184		292		270	170		50	966
TO R & E (KER) & FEO	GPM AVG.			153				2		155
BACKWASH	GPM AVG.	3611	4638	1549	964	1537	3820	4875	4991	25985
TOTAL	M GAL.	3237.1	4596.2	3961.1	3328.0	3600.5	3379.2	7057.6	7847.7	37007.4
PROCESS WATER (BLDG. 190)										
TO REACTOR	GPM AVG.	64596	79289	74035	73187	77114	69800	151000	165800	755361
TO REACTOR	GPM NOR.	83000	96000	81000	82000	84100	84000	173300	177600	861000
POWER HOUSE (K AREA)	GPM AVG.							37	12	49
108 (KE - KW)	GPM AVG.							1393	4547	5940
TO R & E (KER)	GPM AVG.							393		393
BUILDING USAGE	GPM AVG.	400	400	400	400	400	500	400	400	3300
TOTAL	M GAL.	2901.4	3581.4	3322.8	3284.9	3460.2	3138.2	6839.9	7622.7	34151.5
RIVER DATA										
ELEVATION (MSL,FT.)	(MAX.)	397.8		388.4		375.0	380.4		393.5	
	(MIN.)	390.1		381.6		368.2	374.3		384.3	
	(AVG.)	393.0		384.3		370.8	376.3		387.4	
TEMPERATURE	AVG. °F	65.5		65.0		66.6	65.5		64.2	

BM — 5700 — 023 (9 — 58) AEC-GE RICHLAND, WASH.

MONTH: August, 1959

REACTOR OPERATIONS STATISTICS — POWER

SHEET 2

		100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW	TOTAL
WATER TREATMENT DATA										
AT BLDG. 182	MM GALS	-		-		-	-			-
BLDG. 183	MM GALS	2732.9	4596.2	3961.1	2807.3	3600.5	3379.2	7057.6	7847.7	35982.5
CHEMICAL CONSUMPTION										
CHLORINE (BLDG.182)	LBS.	2		-		500	0			502
(BLDG.183)	LBS	23148	39211	31820	25900	29850	26220	69800	74000	319949
	AVG PPM	1.0	1.0	1.0	1.1	1.0	0.9	1.2	1.1	1.1
ALUMINA	LBS	864	-	-	-	-	-			864
		*	0	0	0	0	0			*
ALUM	LBS	129250	185028	235560	154970	167302	193990	315500	402100	1783700
	AVG PPM	* 5.8	4.8	7.1	6.6	5.6	6.9	5.4	6.2	6.1
SEPARAN	LBS	0	0	0	0	0	100	0	0	100
	AVG PPM	-	-	-	-	-	.004	-	-	.004
SULPHURIC ACID (AS 100%)	LBS	161445	264080	185792	121952	193011	146356	399800	425200	1897636
	AVG PPM	7.1	6.9	5.6	5.2	6.4	5.2	6.8	6.5	6.3
DICHROMATE	LBS	41600	50800	49809	50709	52180	48964	101400	110000	505462
PURGE MATERIAL CONSUMPTION										
SOLIDS	LBS	0	300	0	0	0	0	0	0	300

* Alumina & alum combined for avg. ppm.

BM-5700-024 (9-58) AEC-GE RICHLAND, WASH.

MONTH: August, 1959

REACTOR OPERATIONS STATISTICS — POWER

SHEET 3

ANALYTICAL DATA		100-B	100-C	100-D	100-DR	100-F	100-H	100-KE	100-KW
RAW WATER									
pH	pH AVG	8.00	7.90	8.44	8.44	8.40	8.28	7.46	7.78
TURBIDITY	PPM AVG	5	6	5	4	6	4	6	5
FINISHED WATER									
pH	pH AVG	7.10	7.10	7.10	7.05	7.12	7.10	7.06	7.08
TURBIDITY	PPM AVG	.006	.005	.006	.006	.008	.006	.006	.005
Cl_2 RESIDUAL	PPM AVG	.05	.05	.11	.10	.05	.11	.05	.06
DICHROMATE	PPM AVG	1.73	1.71	1.80	1.80	1.81	1.83	1.80	1.80

STEAM DATA		100-B	100-D	100-F	100-H	B-D-F-H TOTAL	KE	KW	KE-KW TOTAL
GENERATED (MAX)	LBS/HR	242000	190000	95000	83000	610000	65000	56000	121000
(NOR)	LBS/HR	110000	120000	78000	73000	381000	-	-	-
(AVG)	LBS/HR	110100	115184	76673	68700	370657	39427	33210	72637
TOTAL	M LBS	81930	85697	57045	51275	275947	29334	24708	54042
TO PLANT	M LBS	69476	72671	50200	43481	235828	26401	22237	48638
COAL RECEIVED	TONS	0	522	830	1079	2431	-	-	
CONSUMED	TONS	5063	5361	3657	3675	17756	-	-	
IN STORAGE	TONS	30324	32908	16491	17740	97463	-	-	
GEN.STEAM/LB.OF COAL		8.09	7.99	7.80	6.98	7.77	-	-	
OIL RECEIVED	GALLONS						0	429104	429104
CONSUMED	GALLONS						256620	223598	480218
IN STORAGE	GALLONS						818328	952728	1771056
GEN.STEAM/GAL.OF OIL							114.3	110.5	112.5

ELECTRICAL DATA			
TOTAL GENERATED KW HRS.	1579200	1635200	3214400

FACILITIES ENGINEERING OPERATION
MONTHLY RECORD REPORT

AUGUST, 1959

I. ORGANIZATION AND PERSONNEL

A. Responsibility

There were no chages of assigned responsibilities during the month.

B. Personnel Statistics

	July 31, 1959	August 31, 1959	Net Change
Employees on Permanent Roll	179	173	-6
Technical Graduates (Rotational)	8	10	+2
Technician Trainees	2	2	0

	FEO	Technical Graduates Rotational
Transferred into Operation	3	2
Transferred out of Operation	8	0
Payroll Removals	1	0

C. Personnel Changes

G. E. Hammett and O. T. Boness, Project Engineering, were promoted from nonexempt to exempt roll on August 1, 1959.

L. P. Reinig transferred from K Reactor Operation to Plant and Industrial Engineering on August 1, 1959.

R. C. Walker transferred from Reactor Modification Design to NPR Project Section on August 1, 1959.

M. L. Faught transferred from Plant and Industrial Engineering to K Reactor Operation on August 1, 1959.

E. A. Smith transferred from Facilities Engineering management to Manufacturing on August 1, 1959.

Barbara Collins, Secretary, transferred from Plant and Industrial Engineering to Research and Engineering on August 3, 1959.

Virginia Bruden, General Clerk, transferred from Equipment Development to H Reactor Operation on August 10, 1959.

Frances Bennett, Secretary, Plant and Industrial Engineering, was granted a leave of absence, August 14, 1959.

J. K. Griswold, Fieldman, was transferred from Project Engineering to H Reactor Operation August 2, 1959.

J. A. Kinzebach, Design Draftsman, was placed on the rolls with Plant and Industrial Engineering August 17, 1959.

W. T. Merten, Design Draftsman, was placed on the rolls with Plant and Industrial Engineering August 24, 1959.

D. O. Allred, Engineering Assistant, was transferred from Equipment Development to HLO August 31, 1959.

D. F. Deschane, Engineering Assistant, was transferred from Equipment Development to H Reactor Operation on August 24, 1959.

D. Personnel Development

No courses were offered.

E. Safety and Security Experience

Six medical treatments were reported.

No security violations were reported.

II. MONTHLY REPORT OF INVENTIONS OR DISCOVERIES

All persons engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during the period covered by this report except as listed below. Such persons further advise that, for the period therein covered by this report, notebook records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

None.

III. ACHIEVEMENT

A. Reactor Modification Design

1. Research and Development

Work has been resumed at Washington State College on the downcomer model test program following the receipt of security clearances and the establishment of classified repositories. A number of additional security clearances have been requested for personnel assigned to this program at WSC. The tests upon which work has been resumed are short term tests in support of the bulk temperature increase program at 105-DR. The progress of this program has been delayed by the upgrade in classification of the downcomer model test program. Work has been started in establishing the technical details of the long term test program in general support of the bulk temperature increase program.

Preliminary analytical work in support of the study of coolant backup facilities for the existing reactors is proceeding. The general study objectives, program, and areas of interest have been outlined and submitted for the review of various interested groups. Further work on this program has been temporarily delayed pending resolution of several questions of basic system philosophy. Studies of alternate "last ditch" water supply systems are continuing

2. Design Projects

(a) CG-775 - 100-K Water Plant Expansion

An inspection was made during the month of the modified prototype pump set in 190-KE. This inspection was made after approximately three months service. No evidence of cavitation or other unusual conditions was noted in the low lift pump. However, some evidence of cavitational attack was found on all vanes of the high lift pump impeller. This attack appears to be attributable both due to imperfections in the manufacture of impeller, particularly in grinding of the inlet vanes, and the need for a slight revision in the inlet vane angle. Discussions have been held with the pump vendor to initiate action to obtain a new test impeller and/or modification of the presently installed impeller. The cavitational attack noted is not felt to be serious and is expected to be readily corrected; however, some delay in completion of the prototype pump development program will occur. It is estimated that at the present rate of attack an impeller life of 1 1/2 to 2 years would be achieved. No other evidence of difficulty was found in the prototype pump set.

Scope drawings of the proposed new river pump house, raw water system piping, and a document establishing raw water system flow requirements have been approved by the Project Representatives and forwarded for Design Council approval. The preparation of additional scope material continues.

A purchase specification and drawings were prepared and forwarded to 100-K Area for the procurement of a spare 1500 HP low lift pump motor. This motor will be procured as a spare parts item, but utilization will be made of it during the rewinding of the existing low lift pump motors from 900 to 1500 HP.

The reports of the 181-K and 190-K model test program have been submitted for formal declassification in order to clarify the security classification of these reports, since the basis for the recent upgrading of these programs is open to some question.

(b) CGI-791 - Reactor Confinement

Design activities have been directed towards the completion of the remaining design items for this project. All Title I design activities have been completed with the exception of a number of questions relating to the 105 Building ventilation system which are to be included in the Phase III Design Criteria. Preparation of the final draft of this criteria has been started. The Title II design for Phase I is complete and revision of the Phase IIb drawings to reflect field conditions has been essentially completed. Purchase specifications for the absolute filters have been completed and issued. Purchase specifications for the filter frames and seals are being prepared. The Phase III detail design is proceeding as additional items of scope definition are established. There has been some regression in percentage completion for this portion of the design during the month, due to the inclusion of additional drawings in the design schedule.

The overall completion of the testing program is now 70 percent complete, with actual testing started on all tests but the Environmental Component and Halogen Collector tests.

Additional test runs have been completed in the ORNL Irradiated Uranium Oxidation Tests. These tests were for the purpose of verifying previously obtained data and as preliminary runs for the final high exposure He-CO_2 tests.

The analytical study of reactor incidents and the proposed confinement system has been completed, and issued in rough draft form for review. The study of alternate halogen

collector systems has been completed and the study report is being prepared. Work on the study of sealing the reactor buildings is continuing and has been essentially completed, except for several items regarding the ventilation system air balances. Completion of this study is delayed pending completion of the strength tests of wall and roof materials. These tests have been completed except for the testing of alternate coating materials and shear tests of transite walls.

Tests of the second filter frame seal have been completed. Additional seals are on order for further testing. Fabrication of components for the Environmental Component tests is near completion. Installation of the test equipment will be dependent on the availability of reactor outage time. The Filter Life Tests are continuing with primary emphasis being given to the selection of roughing filter media for use in series with the absolute filters.

Fabrication of equipment for the Halogen Collector Test Program at the A. D. Little Co. has been essentially completed. All major equipment components have been delivered and partial equipment checkouts have been completed. The initiation of actual testing is dependent on the completion of installation of the test equipment.

(c) CGI-839 - KER Loop Conversion

The design criteria and scope drawings for this project were approved by the Design Council and HOO-AEC during the month. Detail design has been started on the loop process piping, is continuing on the process tube assemblies, and has been completed on the neutron monitoring system. Purchase specifications have been issued for various items of electrical equipment and the neutron monitoring equipment. Design test requests have been issued for flow and pressure testing of the new process tube assemblies.

The procurement specification for the new loop pumps has been completed and issued for comment. Several additional visits have been made to vendors to discuss the application of mechanical seals to this type of service. Tests have been started to determine the relative decontaminability of samples of various surface finishes of castings to determine the volute finish which will be required.

A request has been issued to HOO-AEC for the negotiation of an Architect-Engineer contract for the preparation of the 1706-KER Hot Maintenance shop building addition detail design. The detailed design criteria for this work has been completed.

Additional tests of the raw water cooling system were made to determine system characteristics. These tests indicated that the presently installed raw water pumps are adequate for the proposed conditions.

(d) CGI-844 - 100-K Back Up System

The general scope of this project was reviewed by the Project Representatives, and several basic decisions regarding this project have been submitted for Design Council approval. Based upon several analysis of the problem and the published reactor safety criteria it was recommended that the proposed steam crosstie and 4160 V electrical crosstie systems should be deleted from the general scope of the project and that the steam turbine pump installation would proceed as initially planned. Available information indicates that it will be questionable if the HPCT line will adequately serve as a "last ditch" system without extensive modification. Additional studies of the "last ditch" system requirements and performance have been started.

(e) MJA-18 - 100-K Graphite Restoration

Acceptable bids for the fabrication of ceramic HCR sleeves were received and a purchase order awarded for the prototype units. The Design test for in and out of pile testing of these sleeves upon receipt has been issued. Initial vendor contacts have been made regarding the availability of load cells for use in measuring forces exerted on the reactor shields by the graphite stack. A single point motion indicator has been installed at 105-KE to determine the magnitude and rate of any additional stack movement.

3. Visitors

Mr. E. E. Lindros, Chief Hydraulic Engineer, Byron Jackson Pumps, Inc., Los Angeles, California, visited August 25 to inspect cavitation damage to 190-KE process pump No. 1.

4. Trips

H. W. Heacock and E. R. Rudock visited Byron Jackson Pumps, Inc., Los Angeles, California, August 13 and 14 and the Bingham Pump Co., Portland, Oregon, August 17 to discuss the application of mechanical seals to high pressure-high temperature pumping applications.

D. F. Watson visited Solar Aircraft Co., San Diego, California, August 31 to discuss the use of gas turbines as emergency power sources.

5. Significant Reports Issued

HW-60747 - "Design Criteria, Modification of Fuel Element Test Facilities - 1706-KER, Project CGI-839", E. R. Rudock June 22, 1959, Confidential.

HW-61406 - "Trip Report - Liaison on Testing Programs and Material Procurement for Project CGI-791, Reactor Confinement", E. L. Etheridge, August 5, 1959, Unclassified.

HW-61407 - "Design Criteria for Test Facilities, 1706-KER Decontamination and Hot Maintenance Shop", E. R. Rudock, August 5, 1959, Unclassified.

HW-61631 - "Design Test Request No. DT-1058, Nozzle Assembly Test for 105-KE Test Holes", R. E. Hubbard, August 24, 1959, Unclassified.

HW-61632 - "Design Test Request No. DT-1059, Pressure Drop Test of Nozzle Assembly", R. E. Hubbard, August 24, 1959, Unclassified.

GEH-24522 - "Hydraulic Model Studies, 100-DR and 100-F Downcomers, Supplemental Contract No. 3, DDR-41", C. C. Lomax and L. J. Mathers, State College of Washington, August 31, 1959, Confidential.

B. Equipment Development

Design and performance specifications for C Reactor outlet ball valve assemblies are completed and invitations to bid are being prepared. Repairs to the prototype, OCD system at 105-C are delaying further operation on active metal columns.

Bids for the K Area Cap Remover were received from four vendors. Low bid by AMF Atomics, Inc., was $485,000. This greatly exceeds the available funds. Bids are being studied and recommendations for further action are being prepared. Specifications are being prepared for the rear face manipulator but no procurement action will be taken until the cap remover problem is settled.

Development of modifications to a standard charging machine for self supported fuel elements was completed. Design of a modification package will be finished next month.

Proposed solutions to the 105 F stuck gunbarrel problem were reviewed and evaluated, and a study was reported in HW-61387. The report recommended a preferred development approach and drew the significant conclusion that any installation of hardware to alleviate the problem requires removal of all the tubes in the reactor.

Technical and man-power scheduling problems are delaying the installation of the stop-gap power rate-of-rise meter. The technical problem concerns electrical leakage-to-ground in certain D Reactor RTD circuits, and its evaluation is contingent on availability of rear elevator time.

A purchase order was placed with EPSCO, Inc., for the high speed semi-conductor type scanner of Project CGI-802. Delivery is scheduled for May 1960.

Two sets of electronics for Project CGI-707 the sub-critical monitor were modified and tested. One unit, installed at 105-B, performed all pre-startup tests satisfactorily and gave favorable results during startup. Beams leaking from chamber positioning mechanism of this equipment present a serious problem, particularly at DR Reactor, and efforts on this project are currently directed toward the solution of these difficulties.

Initial tests of ceramic balls at 305 Reactor indicate that the poison effects of the various substances tried do not agree with the predicted values. Materials Development has been asked to procure additional samples with higher poison composition. A K-type VSR was dropped at 25 feet into a pile of ceramic balls seven inches deep. Three of the approximately 1500 balls in channel were fractured.

The silicone foam proportioning machine was used successfully at 105-B rear face, to repair 14 gas seals. A nozzle insert for temporary sealing of leaking rear Van Stone joints was developed which will seal the joint, assembled without a gasket and with half the tube flange missing, in laboratory tests. This is proposed as a temporary solution for leaking Van Stone problems.

The NPR-PCE loop was continued in use for thermal-cycling tests (on night shifts) and process tube rupture tests. Six process tube rupture tests with cold graphite have been completed to date, and one test with 700 C graphite was performed August 9. Data were forwarded to Process Design for evaluation.

Installation of the two-phase critical flow test assembly was completed. Performance of the test will await completion of the process tube rupture program. Other work performed by Equipment Development on design tests and development assignments specifically requested by the Manager, Process Design was reported to Process Design Operation.

Development work has continued with the Bristol Company on a differential pressure unit similar in function to the Barton differential pressure cell. Bristol feels that they are well on their way to making a unit which requires less space than the Barton and one which eliminates all the linkages of their previous design. Electrical output of this unit will be in the order of five volts across 1,000 ohms.

Engineering personnel from Daystrom Systems, Inc., visited HAPO on August 13 and 14. Their prototype two-channel flow monitor receiver was given a detailed inspection by their engineer who tested it in our precision calibration test facility. Several refinements were developed during this work which will be beneficial in the design of a full scale system. Tests are still under way on stability and reliability of this system.

The four points of the gross gamma fuel rupture monitor in 105-C, which were modified to count rate meter circuits have operated one month without component failure or false indication.

A. O. Smith Company completed the feasibility study on on-reactor flash and pressure welding of NPR process tubes. Discussions will be held with A. O. Smith prior to proceeding on Phase II of the contract which will prove out the Phase I concepts.

Tests of fuses and circuit breakers for circuits in NPR circuitry are reported in HW-61355. Testing of the Revere glass switch, a magnetically actuated flat reed glass-enclosed switch, was completed and reported in HW-61037-A. Basic requirements for two bridge type rod counting circuits was completed in HW-61240.

Visitors

Messrs. W. Waddell, G. Barber, J. S. Burr, and A. H. Webber from Daystrom Systems of Daystrom, Inc., visited Instrument Development on August 13 and 14, 1959 at which time the evaluation of the Daystrom two-channel prototype flow monitor was described and functional requirements outlined to update future prototype development to meet the specifications of the NPR flow monitor design criteria.

Mr. D. Williams of the Chem Seal Corp., Seattle, Wash., visited Materials Development on August 3, 4, and 5, 1959 to discuss the application of coatings to concrete walls.

Messrs. A. D. McLeod, J. W. Mace, and R. W. Wells of the Marine & Industrial Supply Company, Inc., Seattle, Wash., and Mr. J. Gebhardt of the Brinkley Company, Kennewick, Wash., visited Materials Development on August 18 and 19, 1959 to discuss the application of coating materials to the test site at 212-P in conjunction with work being performed by Materials Development.

The following visits were made to Mechanical Development "A": Mr. L. E. Kennedy of Gardner-Denver Company visited on July 23, 1959 to discuss air powered tools. Mr. J. S. Kirkpatrick, Vice-President of Brooks and Perkins visited on August 6, 1959 for discussions on sintered born aluminum needs and poison spline supply. Messrs. T. Leonard and D. Platt of Thompson-Ramo-Wooldridge Corp., visited to receive information for bidders on the cap remover system, on August 12, 1959. Messrs. H. T. Groves and P. G. Cawery of Aeroquip Corp., visited on August 5, 1959, and Messrs. M. Headman, D. Metheny, and R. Luther of Western Gear Company visited on August 6, 1959 for discussions on fabrication of ball valves required for Operational Charge-Discharge.

Trips

C. A. Munro visited the Teleflex Corp., in North Wales, Penn., on July 28 to August 2, 1959 to observe tests of the prototype charge seater device.

C. E. Frantz visited Western Light Metals Company, Spokane, Wash., on August 8, 1959 to inspect castings for floating nozzle assembly prototypes.

J. W. McLaughlin visited Ramset-Division of Olin-Mathieson Chemical Corp., New Haven, Conn., on August 16-21, 1959 for consultation on the use of explosive forming of Van Stones on zirconium process tubes.

R. R. Cone traveled to San Francisco, Calif., on August 15-23, 1959 to visit EPSCO West, Inc., Beckman Instruments, Inc., and Kin Tel Division of Cohn Electronics, Inc., to discuss power rate and intermediate instrumentation. He attended the Wescon Show Sponsored by IRE and interviewed a prospective engineering employee for Instrument Development.

J. H. Fastabend traveled to the Los Angeles, Calif., area on August 12-29, 1959 to visit Leonard Precision Products Company in Santa Ana, Aerojet-General Corp., in Azusa, and Marman Division of Aeroquip Corp., for consultation on fabrication of NPR piping fittings, and attended a two-week seminar on strain gauges at UCLA.

Significant Reports Issued

Undocumented - "Trip Report - Discussion of High Temperature-High Pressure Valve Applications at Puget Sound Naval Shipyard," C. W. Higby, July 9, 1959.

Undocumented - "Status Report - NPR Fitting Development Activities," J. H. Fastabend, August 10, 1959.

Undocumented - "Status of Poison Spline Flexible Control System," P. B. McCarthy, August 10, 1959.

Undocumented - "HWS-4476, Operational Charge-Discharge Outlet Ball Valve - Design and Performance Specifications," R. B. Willson, August 18, 1959.

HW-56001-F - "Interim Report No. 7 - On Internal Chemical Decontamination of KW, KE, and B Reactors, Rear Face Piping with Turco 4306-B," H. F. Jensen, August 20, 1959.

HW-60726 - "Rear Face Fog Spray Nozzle Spacing, Final Report DT-1042," C. H. Gydesen and J. A. Moir, July 1, 1959.

HW-61037-A - "Revere Glaswitch Investigations," D. E. Gray, August 24, 1959.

HW-61240 - "DC Bridge for NPR Horizontal Rod Counting," M. L. Faught, July 24, 1959.

HW-61275 - "Trip Report - Discussions Pertaining to Procurement of Process Tube Closure Valves for NPR," C. W. Higby, July 28, 1959.

HW-61331 - "Final Report - Materials Test for NPR Horizontal Control Rod Tip Material," R. K. Smith, August 3, 1959.

HW-61355 - "Fuse and Circuit Breaker Test Results for NPR Control Circuits," W. Dalos, August 3, 1959.

HW-61387 - "Recommendations for an Attachment to Relieve Stuck Gunbarrels at 105-F Reactor," P. B. McCarthy, August 10, 1959.

HW-61474 - "Orificed Rear Nozzle Cap for Use in Rear Face Decontamination of C Reactor," R. F. Scheloske, August 10, 1959.

HW-61478 - "Safety Circuit and VSR Delay Times," P. C. Althoff, August 24, 1959.

C. Plant and Industrial Engineering

1. Drafting Operation

Summary of Drafting Operation services provided is:

New, revised, as-built drawings	182
Sketches, layouts and charts	75
Microfilm drawings added or retired	1350
Film Prints Produced	288
Check Prints Produced	677
Catalogs Added	83
Customers Serviced Print Files	179
Customers Serviced Catalog Files	22

2. Reactor, Plant Engineering

Closed Circuit Television

Demonstrations of prototype equipment were conducted for Maintenance Engineering Supervisors and Processing Managers. Equipment demonstrated included the the new transistorized camera and a mock-up of the Optical Scanner to be used as replacement for Pan and Tilt equipment for rear face viewing.

Rear Header Expansion Joint Failure at 105-KE

Failure of rear header expansion joints at 105-KE is currently being studied. Dimensions of the expansion joints in service under various conditions of cold water flow have been measured at both 105-KE and KW. Instrumentation for obtaining vibration data from these joints during reactor operation has been received and is being calibrated in preparation for installation on the reactor.

Improved Rear Face Decontamination

Scope reports, economic justification, estimates, etc., have been issued by Reactor, Plant Engineering to cover the desired improvements at all reactors. At the request of Processing Operation representatives for B, C, D, DR, F and H reactors, project action for improved rear-face decontamination facilities is being held in abeyance, pending further consideration of financial justification by the Processing Operations.

Rear-Face Pigtails

An investigation of the extent of stress corrosion on rear-face pigtails at B, D, and F reactors is in progress to evaluate the probability of future reactor outages to be caused by failure of these units. A sample lot of 50 pieces from F reactor has been decontaminated and delivered to the Radiographic testing Operation for "Zyglo" inspection.

Charge Seater - All Areas

Two Charge Seaters using 1.9 HP Keller Motors have been completed for 105-F. An Appropriation Request for Charge Seating equipment for all reactors has been approved.

3. Standards Engineering

Spare Parts

Stores Stock Requests Processed		8
Stock Adjustment Requests Processed		56
Maximum Authorized dollar value of new items added by SAR's	$ 45,495	
Maximum Authorized dollar value of spare equipment requested by letter to Project Engineering	16,955	
Maximum Authorized dollar value of spare parts requested for Projects by SARs	1,500	
Number of Engineered spare parts items reviewed		33
Number of Drawings ordered revised		4
Actual dollar value of items deleted from spare parts stock	148	
Maximum Authorized dollar value of items deleted from Spare Parts stock	2,200	

A special IBM report has been received from Spare Parts showing the investment in IPD spare parts by building. This information is being circulated to interested IPD Managers.

The reactor process tubes purchased from the Reynolds Aluminum Company have proved to be satisfactory in every respect to date. The installation of six of these tubes in the 100-F reactor was completed without difficulty. A record is being kept of the tube numbers in each reactor where the Reynolds tubes are installed so that any significant developments with respect to these tubes will become readily known.

Engineering Standards

The guide for maintenance work on code piping has been prepared and drafting work finished on August 14, 1959. Reproduction for distribution is underway.

Craft Training

The Instrument Specialist Selection Tests for this period were completed. Twenty Instrument Technicians participated in this series of testing with eight participants achieving passing grades. Approval has been received from the Manufacturing Operation to proceed with the proposed Instrument Trainee Training Program.

4500 HP Motor Drives

As part of the program of data collection aimed at evaluating the quality of the insulation of the subject units, the phase and neutral resistance (DC) of four motors in 100-F Area were measured using the Biddle "Ductor".

The set-up for a bench type Power Factor test on two coils removed from one of the subject units is in progress at the Construction Engineering and Utilities shops in 200-E.

Oscillographic recordings were made of voltages and currents at the terminals of a 4500 HP synchronous motor during start, stop and field failure conditions. These tests were performed to study possible effects of transients and to determine if the neutral shifted. The results of the tests are generally negative indicating that voltage transients available to the motor terminals, field decay and neutral shifts are not of sufficient magnitude to have been a root cause of coil failure.

100-B-C Trip-out Tests

Engineering assistance was given in the performance of the dual area trip-out tests at 100-B-C areas. Recordings were made of pressure, flow and speed decay as well as timing of various safety circuit relays. Instrumentation was used to determine the magnitude of power loss from flywheels through electrical generation. All phases of the tests were carried out expeditiously and data was satisfactorily recorded. Analysis of the data is underway.

Repair of 100-F Outfall Lines

The scope for the modifications to the 100-F outfall lines has been issued. The estimate of six to seven days outage time and $65,000 to $70,000 is based on replacing the two sections of concrete pipe from the outfall box to the steel lines with 48" coated steel pipe and installing a Dresser coupling in each line about 20 feet from the outfall box. The exact condition of the concrete pipe, of course, will not be known until the pipe is uncovered at the time the modifications and repair work is to be done.

Reduction of Chemical Costs in 100 Areas

The third aluminum oxide-sulphuric acid feeder test model has been fabricated and is being installed at 183-B. This model had improved features resulting from operational studies of the previous model.

The scope document describing the proposed installation of the new feeder systems in the 183-B, C, D, DR, F and H Areas has been completed and approved by the Power Managers. The final report is being assembled for transmittal to Project Engineering Operation.

The "Signalmen Permit Cards" have been issued to all of those Maintenance employees who passed the test given in conjunction with the training classes covering crane hand signals.

4. Industrial Engineering

Rear Face Improvements All 105 Buildings

To improve charge-discharge activity in the older reactors, rear face nozzle cap material handling equipment similar to that described for 105-KE-KW has been programed for 105-B, C, D, DR, F and H. The improved material handling equipment for 105-DR, consisting of four nozzle cap trucks, 96 light metal cap trays and movable gravity conveyor sections, has been installed and is ready for use. The engineered method, including multi-man charts describing crew deployment and task sequence for each man in the crew, has been prepared. It is planned to use the equipment and the engineered method during an outage at 105-DR early in September.

Metal Handling, 300,100

As a part of the three-phase program for charge-discharge improvement which has been formulated by IEO, the matter of fuel element shipment from FPD to IPD was studied. It is believed to be desirable to ship premade tube charges of fuel elements from FPD instead of shipping pallets, each containing a large number of slugs. The first design of such a container for testing has been completed.

Charge Discharge Operation Study, 105-C

Charge-discharge during the August 4 outage was covered by IEO personnel to implement preinsertion and to observe other improvement areas. Premarked tubes were preinserted with downstream dummies smoothly during rear face setup time and with a net savings of 147 minutes. As a result of C Processing Operation's decision to increase the actual charging machine strokes from 37 per minute to 40 per minute, C Operation saved an additional 36 minutes of outage time during the remaining charge-discharge.

An extended outage at 105-C was studied in detail by an Industrial Engineering team. Recommendations were supplied to C Processing management.

5. Water Plant and Utilities Engineering

Engineering in Support of Power Forecasting

Area power use was studied closely to follow the changes in demand occasioned by the utilization of steam. Maximum electrical equivalent of the steam is approximately 8 megawatts if it were convenient to replace electric driven equipment. Actual displacement however, amounts to approximately 3 MW.

River Temperature Control by Dam Regulations

Regulation of the river temperature control was initiated August 7, 1959. Financial arrangements made by the AEC indicated that optimum results could be obtained by increasing the electrical generation at Grand Coulee to the maximum practicable value, and supplementing this cold water flow with additional flow using the by-pass tubes. Four tubes were initially opened. The resulting reduction in river temperature was first noticed August 11, and has continued to represent an improvement of from 1-1/2 to 2-1/2° over the natural conditions that would be expected. Excellent favorable weather conditions have increased river cooling by reduction of isolation, normally expected.

Rehabilitation of B Effluent System

Extensive efforts were continued to derive an appropriate scope of work for this activity. Because of the large size of the lines, the cost of any re-routing tends to be high. As a result, a considerable number of alternate proposals can be developed and have been explored. As a matter of policy, by-passing has been considered a second choice to continuing the present systems of retaining effluent before discharge to the river. A cost estimate of an optimum system acceptable to management is being prepared.

6. Visits

Mr. J. M. Smith, G.E. Lighting Consultant from Nela Park visited IPD installations from August 4 to August 13, 1959, to advise on lighting problems.

7. Trips

H. A. Kramer made three trips during the month to Grand Coulee Dam relative to controlled release of water.

J. C. Baudendistel made a trip to Roslyn, Washington, to explain to personnel the importance of proper size consist of coal for use in boilers in the 100 Areas.

D. Project Engineering

1. Projects

Number of Assignments	Description	Balance
18	Active Construction Projects	$3 476 800
1	Active Design Projects	25 500
4	Active Expense Jobs	575 700
6	Completed Projects - Accrued	1 974 500
	Plant Assistance	57 000
	Customer Work Orders	84 600
	Total	$6 194 100

CG-558 - Reactor Plant Modifications for Increased Production

Pump Test Stand

The contractor resumed work after the labor walk-out on July 31, 1959. An exact determination of contract extension has not been made.

The Army building used as a shelter structure for the pump test stand has been located on its base.

190 Annex Process Pumps

An inspection was made on Units No. 6 and 7 in DR to determine cavitation effects. No. 6 was installed February 4, 1959 and has operated approximately 3500 hours. The PW-1419 impeller in the first stage shows no attack whatsoever due to cavitation. Unit No. 7 which was installed on April 22, 1959 showed the beginning of errosion on all vanes of the first stage impeller which is type PW-1417-2. This examination conclusively proves the superiority of the PW-1419 type impeller for first stage application in the DR area.

Ingersoll-Rand was unable to complete the testing of their prototype pump as scheduled for the first week of August due to lack of sufficient steam delivery to the turbine driving the unit. A test was run at 1600 rpm instead of 1900 rpm. This run is not official and they are moving the unit to a larger turbine and have rescheduled the run four to six weeks after the U. S. Steel Strike has been settled. Their workers are represented by the Steel Worker's Union and this plant struck on August 13, 1959.

CG-674 - Water Plant Component Test Loop, Building 1706-KE

A revision to the project proposal has just been submitted requesting an extension of time of four months. The present

completion date is August 31, 1959. A continuation of troubles encountered during the running of the ATP of the loop, which was fabricated by Alco Products, has prevented acceptance of the equipment prior to August 31. The nature of work required on the loop to complete the ATP is known, and K Area Maintenance personnel will accomplish the work.

CG-707 - Improvements to Reactor Nuclear Instrumentation - All Reactors

The first channel has been installed at 105-B and was placed in fully operating condition on August 26. During the reactor start-up, August 27, this equipment operated as expected by the designers. It has definitely improved the pile operator's control of the reactor during start-up and has given an indication approximately seven minutes in advance of the previous equipment. In addition to this improved response time it gives a much closer indication of the effect of control rods.

New shielding has been fabricated and installed to reduce the radiation leakage from the equipment installed in the A test hole at 105-DR.

CGI-791 - Reactor Confinement

Phase I - Fog Spray

The Fog Spray Systems are manually operable in 105-B, D, DR, F and KE. Supply piping is complete in 105-C, H and KW. Further work in these areas await D elevator outage time.

Fog Spray work is approximately 67 percent complete.

Phase II-A - Site Preparation

Site preparation work is progressing in all areas. This work is approximately 9½ percent complete.

Phase II-B - Lump Sum Contract

As of September 1, 1959, bid package information including special conditions, specifications and ATP's were transmitted to the AEC Contract Unit. Substantially all drawings are in the process of being corrected by Design to incorporate the necessary comments and changes. Substantially all tracings will be ready for issuance as part of the bid package by September 1. The remaining drawings will be completed by September 8, 1959.

CGI-807 - Modifications to Building 1713-D

Equipment Development personnel moved into the 1713-D building on August 5. Final inspection was conducted on August 14, and the

contractor is now completing the exceptions which were noted during this inspection.

CGI-817 - Crossheader Pressure Differential Indicators and Alarm Systems, Hanford Reactors

Beneficial use of the equipment installed was attained at 105-KE on August 1, and at 105-D on August 17. Work remaining at both of these areas includes the electrical connections which will provide indication of low water differential pressure in the control room. At 105-B all installation work requiring outage time was complete on August 26.

CAI-823 - Electrical Work, Buildings 1760-H and 1761-H

Work was resumed after the strike on July 30, 1959. All work is now complete on buildings 1760 and 1761-H except for punch list items and for some additional work which has been given to the contractor by a change order.

CAI-831 - Fence and Badge House Relocation - 100-F Area

Contractor started work on August 6, 1959. Base has been poured for the badge house. Most of the forming and steel work has been completed for a monolithic pour of walls and roof. Installation of new light poles has begun.

MJA-16 - Replacement of Roof Slabs, 190-B Tank Room

Previously reported was the rejection of the contractor's work on the roof for non-conformance to the contract specification. This problem was resolved and the contractor removed that portion of the roof which did not meet specification. The work has been proceeding and is now essentially complete. Final inspection is scheduled for August 28.

On August 13, approximately 6:30 p.m., a small fire was discovered on the northwest corner of the roof. Actual cause cannot be determined, but the fire resulted in necessary replacement of three sections of steel roof deck and a section of insulation and built-up roof approximately 20' x 40'. The fire was extinguished promptly by G.E. fire protection people.

2. Project Proposals

CGI-791 Rev. 3	Reactor Confinement
CGI-839 Rev. 1	Modification of Fuel Element Test Facilities, 1706-KER
CAI-868	Columbia River Scale Model

CGI-869	Operational Charge-Discharge, C Reactor
CGI-871	Improved Dummy Decontamination

Projects Awaiting AEC Approval

CAI-835	Additional Office Space, 100-D Area
CGI-844	Coolant Backup, 100-K Area (Interim authorization of $30,000 received July 20, 1959)

Requests Received for Project Preparation

60-a-6	Water Plant Expansion, 100-K
CG-674 Rev. 4	Water Plant Component Test Loop, Building 1706-KER
CAI-849 Rev. 1	Regulated Maintenance Shop

MANAGER
FACILITIES ENGINEERING

RELATIONS PRACTICES OPERATION
AUGUST 1959

PERSONNEL PLACEMENT

Experienced BS/MS recruitment continued active while PhD recruitment decreased to the normal seasonal level. Exempt transfer activity declined somewhat.

Six experienced BS/MS candidates were interviewed during the month with one IPD offer extended. There was one acceptance and one rejection, leaving no offers open at month's end. There was one PhD candidate interviewed during the month with no offer extended. We have one previous PhD offer open at month's end.

There were two exempt transfers into the Department from other HAPO components. There were no transfers out of the Department. Three non-exempt employees were upgraded to exempt status. One employee resigned to accept outside employment and two summer employees terminated.

OFFICE SERVICE

Participants have been selected for the coming presentation of PBM-I which will get under way September 17. Meeting dates and locations have also been established for each of the four classes, and course materials procured.

The Secretarial Proficiency course, scheduled to start in September, has been re-scheduled for January, 1960 - when Dr. T. A. Wickes will again be available to contribute time to this training effort.

Renovations of office space in 1713-B Building for a new 100-B Area duplicating facility were completed during the month. Present plans are to place the facility in operation on September 14.

COMMUNICATION

Mass communication activities included the publication of six Management News Bulletins, one Round Table Guide, two IPD Employee Headliners, six priority messages, four IPD OPGS and six HAPO OPGS were issued during the month. GE NEWS coverage included eleven items about IPD activities totaling 105 column inches, or 23% of all available space. There were no Management Information Meetings held during the month.

SALARY ADMINISTRATION

Salary Administration activities during August were primarily routine in nature. Non-routine items included providing consulting service to the recently established Manufacturing Section relative to the establishment of administrative positions. In addition, the Position Relationship Data sheet for the Department was issued.

WAGE & BENEFITS

During August, IPD paid a total of $270 in suggestion awards to 15 suggesters for a total of 17 new suggestions and one supplemental award. The highest award was $80.

HEALTH & SAFETY

There were no disabling injuries reported in August. Since our last injury (3-16-59) over 2,000,000 injury-free hours of exposure were accumulated. On 8-21-59 IPD qualified for the Safety Council Award and gift selection lists were distributed to all eligible employees. The returns have been compiled and samples of 18 awards most frequently selected will be displayed for employees' final choice. Medical treatment injuries were down slightly but those reported appeared to be the common type anticipated.

Three serious accidents were investigated. Reports were circulated to all management.

No security violations were reported during August. This is the second "free" month since start-up of IPD - the last free month being January 1959.

The experimental loop testing operation in 189-D was conducted on 8-15-59 with the safety aspects carefully analyzed by operating personnel, outside consultation and IPD's Health & Safety personnel. The safety results were excellent.

Additional sprinkler coverage in 1717-K has been agreed upon and specifications have been approved.

Preliminary work on reactor confinement is under way in several areas. We are carefully observing work progress.

Standardization of acid handling in all Power Operations has been approved and adopted.

Recommendations for improving traffic flow and the reduction of accident potentials at the new badge house area - 200 WYE, have been submitted and assurance of the adoption in part has been acknowledged.

E. F. Fitzmaurice

FINANCIAL OPERATION
MONTHLY RECORD REPORT
AUGUST, 1959

General Accounting

Two meetings were held in August, 1959, with representatives of HAPO Financial Operations to discuss formal procedures for transfer of costs between J.A. Jones Construction and General Electric, as a result of the transfer of certain accounting responsibilities from CE&U to J. A. Jones, effective October 1, 1959.

Product Cost and Budgets

NPR Project Section personnel were assisted in the preparation of preliminary estimates of manpower, material, and other cost requirements for maintenance and operation of N Reactor to be used in a document to be issued for the Federal Power Commission.

A procedure was established for the accumulation of major repair costs on 4500 HP motors.

IPD report on Representative Economy Measures was issued on schedule.

A report was prepared showing the effect of the higher steam loads on coal consumption for the month of July, 1959, compared with July, 1958.

Procedures

Several systems for accumulation of various types of cost from time cards, work orders, purchase orders, store orders, etc. through Data Processing have been evaluated.

A procedure was instituted to publish in the Management News Bulletin, changes in forms used on a plant wide basis.

Auditing

A report was issued of the audit of the records supporting the determination of the Safety Council Award achieved on August 21, 1959.

Six proposed HAPO Organization and Policy Guides covering Property Management were reviewed and comments for the Department were submitted.

Anticipating the survey of Top Secret and Weapon Data clearances by Security and Patrol Operation listings were prepared for review by various Operations Managers.

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General

No inventions or discoveries were made during the month by Financial personnel.

D. F. MacNaughton
Manager-Finance
IRRADIATION PROCESSING DEPARTMENT

DR MacNaughton:asr

SUMMARY

Construction work at the N site has consisted of installation and testing of 1400 feet of the six-inch steel water line to be used for the TC fire line. Contracts have been awarded for the 13.8 kv line from 151-D to the N Area site. Grading work has been started on the access roadway, by L. W. Vail Company.

Harvey Aluminum Company appears to have successfully extruded zirconium tubing in 44 foot lengths. Final inspection of these extrusions has not been made. This operation is one of the critical phases of zirconium process tube fabrication.

Charts of three possible organizations for operation of 100-N Reactor have been developed for operational planning. These charts incorporate the organization structure, describing functional responsibilities for each position.

Kaiser Engineers are preparing a new Project Estimate which will be available September 8. Current indications are that the estimate may be in excess of the $145,000,000 as authorized by Congress.

A total of seven simulated process tube rupture tests have now been run. Results indicate the main potential problem is whether stack lifting in an actual in-pile tube rupture will be sufficiently severe to induce rupture of other tubes. Additional testing will be required to determine this.

The Architect-Engineer has been given sufficient direction to permit proceeding with scope and detail design. Problems of establishing adequacy of scope with minimum delay to the over-all program were discussed with the Architect-Engineer and the Atomic Energy Commission. Bid proposals for the main heat exchangers were reviewed and commented upon.

Reactor plant design work during the month kept pace with the over-all schedule. Scope design has fallen no farther behind schedule. However, development and test support continues to slip.

On heat dissipation system design, a revised scope schedule has been received which indicates work is not now behind schedule but the rate of progress called for over the next few months is substantial so that extraordinary measures will have to be taken to prevent falling behind the revised schedule.

NPR PROJECT OPERATION
MONTHLY RECORD REPORT
AUGUST, 1959

I. ORGANIZATION AND PERSONNEL

A. Responsibility

J. S. McMahon is attending the Management Training Program at Crotonville, New York, for the period August 6 through October 10, 1959. W. W. McIntosh was appointed Acting Manager of the NPR Project Operation during his absence. C. E. Love was appointed Acting Manager of Field and Operations Engineering replacing Mr. McIntosh.

B. Personnel Statistics

	July 31, 1959	August 31, 1959	Net Change
Employees on Permanent Roll	66	68	+2
Technical Graduates (Rotational)	2	1	-1
Technical Trainees	0	0	0

	NPR	Technical Graduates (Rotational)
Transfers into Operation	3	0
Transfers out of Operation	1	1
Payroll Removals	0	0

C. Personnel Changes

J. H. Budd and R. C. Walker transferred into Field and Operations Engineering.

N. O. Strand transferred into Process Design Operation.

N. LaVerne Collins transferred out of the Operation to take a secretarial position at APED in San Jose, California.

D. Safety and Security

Continued follow-up on safety and housekeeping items throughout the 762 Building was maintained. No medical treatment injuries were reported.

No security violations were reported during the month.

II. MONTHLY REPORT OF INVENTIONS AND DISCOVERIES

All persons engaged in work that might reasonably be expected to result in inventions or discoveries advise that, to the best of their knowledge and belief, no inventions or discoveries were made in the course of their work during the period covered by this report. Such persons further advise that, for the period therein covered by this report, notebook records, if any, kept in the course of their work have been examined for possible inventions or discoveries.

IV. ACHIEVEMENT

A. Process Design

1. Research and Development

Seven tests have been run to date in the high pressure process tube rupture simulation facility. As reported previously, the first four tests were performed with ambient temperature graphite and saturation temperature water at 200, 400, 600 and 800 psig. Graphite damage was limited to the tube bearing block but there was evidence of increasing degrees of stack lifting as pressure was increased.

The fifth test was with unheated graphite and water temperature corresponding to the saturation temperature at 800 psig but with the water pressure raised to 1000 psig. Results showed that stack lifting varied with burst pressure, not temperature. It thus appears that at least for the type of rupture being simulated here, main damage is from the momentum of the initial release of coolant from the rupture and that subsequent steam expansion and pressure dissipation is taken care of adequately by the venting provisions.

The sixth test was at 600 psig and saturation water temperature, as in the third test, but with the graphite heated to about 700° C. Results indicated that the steam picks up a considerable amount of heat from the stack which should increase the general level of stack pressures compared to the cold tests. Observed pressures and stack lifting probably did not show the full extent of this effect due to unplanned loosening of some of the refractory brick used for insulation which may have allowed some of the steam to by-pass the stack. This will have to be verified in later heated graphite tests.

The seventh test was an attempt to parallel the 800 psig cold test with graphite temperatures in the upper range of that expected for NPR structural graphite. However, failure of a large number of the heating elements to function properly resulted in the test being run at lower graphite temperature. Significance of the data obtained has not yet been assessed.

Further tube rupture tests will be deferred for approximately three weeks while the facility is being rehabilitated. This will permit data to be obtained on two-phase flow from a simulated process piping rupture, making use of some facilities common to the tube rupture test set-up.

2. Project CAI-816

A second draft was published of the document which describes the current NPR confinement system design. The purpose is merely to provide interim information regarding design provisions and the probable capability of the resulting system, since formal hazard analysis activities are apparently still some time in the future.

Five reactor plant design criteria were approved by project representatives during the month leaving nine yet to be processed out of a total of forty-two. With the exception of design testing, current status of all elements of reactor plant design is very close to schedule. Over-all reactor plant design progress is 26.7 percent complete, compared to 22.6 percent at the end of last month. Scope design stands at 83 percent complete, against 74 percent at the end of last month.

Sequencing of a number of groups of drawings has been altered to permit completion of specific packages required for desirable methods of contracting and construction scheduling. Also, it has been agreed that additional technical data will be provided where feasible in support of unit cost contract negotiations prior to completion of design packages.

Of the anticipated development and testing program which totals 85 items, 15 have been completed, 57 are in progress, and 13 are in planning stages. Weighted assessment of accomplishment indicates this program is from one to three months behind schedule.

On heat dissipation system design, the A-E reports scope progress to be approximately equivalent to the latest schedule figure of about 45 percent complete. However, it should be noted that this schedule calls for a progress rate of 15 percent per month whereas only about 5 percent has been gained over the last five months. Over-all design is reported as 20 percent complete compared to 27 percent scheduled.

Project representative approval was given to a revised approach to sizing of the demineralization plant and to the criteria for establishing river pump house capacity.

Discussions were held with AEC and A-E representatives regarding the processing of scope material. The extensive overlap of scope and detail design required to accommodate the recent changes in concept without extension of completion schedule require that some increase in risk be taken that scope material may not be approved when submitted and

2. Project CAI-816 (Continued)

that as a result, a significant amount of detail design will be wasted. It was emphasized that scope material must be adequate to define the design so that general acceptability can be judged and that approval of scope cannot be considered to be automatic based on communications to date.

Bids on the main heat exchangers were reviewed during the month. With the possible exception of a welding procedure described by one vendor, all bids appeared to meet specifications. Main points of concern were:

a. The conditions on which the bid proposals were based result in low initial secondary steam pressures which may yield minimum heat exchanger cost but actually results in an over-all capital cost penalty due to increases in required pipe weight, valve size and condenser mass flow capacity. In addition, penalties in convertability are incurred.

b. Data on steam separation provisions are sketchy in a number of the proposals; there is honest doubt that the specified steam quality can be attained when operated at design conditions.

c. It is felt that a savings in capital cost could be effected without impairing adequacy of the equipment through use of ASME rather than Military specifications for the main heat exchangers

d. As has been pointed out a number of times, the transient temperature conditions on which the proposals are based do not represent the most severe service that the heat exchangers may encounter. Appropriate consideration must be given this factor in the final heat exchanger design.

3. Visitors

G. T. Lewis, NPR Project Engineer for Burns and Roe visited this site during the month to discuss scope processing problems.

Rudolph Michel of Allis Chalmers visited Reactor Plant Design engineers to discuss earthquake effects on gas-cooled graphite moderated reactor stack design.

G. L. Locke, Consultant to this operation, visited this site during the month for detailed discussion of tube rupture test analytical problems.

4. Trips

W. D. Bainard visited the offices of Sheppard T. Powell and Associates, Baltimore, Maryland to discuss raw water treatment problems.

E. M. Kratz visited the power plant of the Olympia Brewing Company, Olympia, Washington to discuss operating experience with steam-water separation equipment similar in design to equipment proposed for NPR use.

5. Significant Reports Issued

HW-57016 - "105-N Design Criteria - Rod and Shield Cooling Water Supply System," August 4, 1959, G. E. Wade.

HW-57017 RD2 - "105-N Design Criteria - Process Tube Injection System," August 19, 1959, G. E. Wade.

HW-57037 - "105-N Design Criteria - Irradiated Metal Handling Facilities," August 24, 1959, J. F. Nesbitt.

HW-57038 RD2 - "105-N Design Criteria - Miscellaneous Building Mechanical," August 20, 1959, J. F. Nesbitt.

HW-57970 - "Heat Conversion Plant Project Representatives Minutes No. 23," August 25, 1959.

HW-57971 - "Heat Conversion Plant Project Representatives Minutes No. 24," August 27, 1959.

HW-60742 RD2 - "Hanford New Production Reactor Confinement System," Staff of Process Design Sub-Section, August 20, 1959.

HW-61245 - "River Water Levels at 100-N River Pump House," G. R. Hosack, July 24, 1959.

HW-61368 - "Plutonium-241 Content for Proposed NPR Fuels," C. A. Mansius, August 3, 1959.

HW-61371 - "Criticality Considerations for NPR Transfer Cask," D. E. Simpson, August 7, 1959.

HW-61388 - "NPR Project Section Monthly Design Test and Development Program Status Report CAI-816," July 1959, W. J. Morris.

HW-61389 - "Trip Report - NPR Decontamination, Waste Disposal, and Water Deionization Plant," W. D. Bainard and W. D. Gilbert, August 5, 1959.

5. Significant Reports Issued (Continued)

HW-61390 - "Meeting Minutes - NPR Liquid Waste Disposal," W. D. Bainard, August 5, 1959.

HW-61430 - "Separation of Multiplying Slabs by a Thermally Black Sheet," D. E. Simpson, August 7, 1959.

HW-61539 - "NPR Control Strength Calculations," D. E. Simpson, August 20, 1959.

HW-61559 - "NPR Data for Federal Power Commission Conversion Studies," E. M. Kratz, W. J. Dowis, and H. R. Kosmata, August 14, 1959.

HW-61572 - "Thermal Transients for an NPR Lattice and Control Rod," D. E. Sebade, August 18, 1959.

HW-61598 - "Volume Shrinkage of the Primary Coolant after Shutdown and the Transient Temperature Out of the Heat Exchangers," H. Harden, August 20, 1959.

B. Development and Testing

Listed below are significant developments for the New Production Reactor as reported by the Equipment Development Operation of Facilities Engineering.

The Component Test Loop was operated on a three-shift basis to perform three tube rupture experiments and to thermal-cycle three test fittings. Tube rupture test #5 was performed at 1000 psi with a cold graphite stack, tube rupture test #6 was performed at 600 psi with a 700°C graphite stack, and tube rupture test #7 was performed at 800 psi with a cold graphite stack. Minor damage to graphite heaters, instrumentation, and to the closure mechanism is being repaired preparatory to performing additional hot graphite tests. More than 1000 thermal-cycles have been made with two flared zirconium tube-to-nozzle joints and a bell-ring-seal closure.

A test to determine forces required to insert a zirconium process tube in a distorted graphite channel has been initiated. Forces ranging from several hundred to several thousand pounds were required as the graphite was distorted to simulate 0-5-10-20 years of graphite contraction.

Ruggedness of ceramic balls, for potential use in a ball safety system, was demonstrated when only three balls fractured when a K-Reactor-type vertical safety rod was dropped 25 feet onto a 7-inch bed of ceramic balls (approximately 1500 balls).

In fuel rupture monitoring development, the circuitry on four halogen-quenched GM tubes at C Reactor was modified for pulse counting rather than integrating conditions. No false indications or component failures were experienced in this gross gamma monitoring system in the first month of operation.

A. O. Smith Company completed Phase I (the concepts) of their feasibility study of "on-reactor" flash and pressure welding of zirconium fittings to zirconium process tubes. Hanford personnel are scheduled to discuss Phase II (provide prototypic equipment) of this work with A. O. Smith personnel early in September.

In flow monitoring, the Barton Model 224 differential pressure element has qualified as a transmitter component following extensive laboratory tests and industrial usage. A competitive product is being developed by Bristol Company with reduced space requirements and reduced linkages. Two prototypes have been ordered with a promised electrical output of five volts across 1000 ohms.

Testing of electrical components continued and was reported for fuses and circuit breakers, a Revere glass switch, and for two bridge-type rod-counting circuits.

C. FIELD AND OPERATIONS ENGINEERING

1. Activities

Construction

Kaiser Engineers awarded a sub-contract to Tullar Power Construction, Incorporated, for the construction of the 13.8 kv line from 151-D to the N Area site. A sub-contract was also awarded to the L. W. Vail Company for construction of the access highway. Grading work has been started on the roadway.

Approximately 1400 lineal feet of 6" steel water line was installed and tested at the N Area site. This is to serve as TC fire line. Approximately 2200 feet of 12" steel pipe was delivered to J. P. Head at White Bluffs for installation of the TC water line.

Zirconium

Harvey Aluminum has extruded three billets for NPR process tubing. This is the first attempt to extrude tubing in the 44' length. Although the extrusions have not been dejacketed, it appears that excellent results were obtained. Verification of surface finish and concentricity cannot be made until the extrusions are dejacketed by pickling. Pickling facilities are nearing completion. The extrusions will be cold-drawn to NPR size and length in the next several weeks.

Budd Company has completed experimental work on welding extrusions produced on the Allegheny-Ludlum Steel Corporation order. Assembly of the vacuum box in which the tubes will be welded is nearing completion. Allegheny managed to ship nine extrusions to Budd Company prior to the steel strike.

Chase Brass Company is in the act of machining billets for the first lot of tubes on their order.

Graphite

Shop fabrication equipment removed from 2101 Building for the 300 Area Shops has been returned. Negotiations are being made for the return of other items of equipment removed from the building by other components. Investigations are being made for the modification of surfacing equipment needed to machine the various cross-section sizes of NPR graphite details. Kaiser Engineers have been informed of insulation specification requirements for the ventilation units requiring servicing. Estimates are being prepared for the landlord charges to be assumed by the Project during occupancy of the 2101 Building by Kaiser Engineers.

Administrative

The following material was processed by Drawing and Specification Control during this month:

Drawings	158
Criteria	31
Specifications	11
Requisitions	2
ATP's	0
Others	42
Total:	244

General agreement has been reached with Kaiser Engineers, the Atomic Energy Commission, and Burns and Roe on use of a standard requirement form to accompany requisitions. Discussions are continuing on adoption of an agreeable procedure for handling all procurement information.

Discussions were held with the Atomic Energy Commission and Burns and Roe on Burns and Roe's field responsibilities.

Discussions are continually being held with Kaiser Engineers and the Atomic Energy Commission on establishing efficient procedures for all items connected with the construction operation.

Design Review and Consultation

Reviews were completed and formal comments were offered on scope and design material as follows:

Drawings	36
Specifications	11
Criteria	32

In addition to the regular Project Representative meetings, a special meeting was held with Research and Engineering, Process Design, and Hanford Laboratories personnel on the graphite program, including irradiation testing, tube rupture test, and procurement.

The main heat exchanger bids for the heat conversion plant were reviewed.

Special Activities

None.

Operational Planning

Charts of three possible organizations for operation of 100-N Reactor have been developed. The charts incorporate the organization structure with thumb-nail functional responsibilities for each position for study by Irradiation Processing Department management.

Initial contacts for defining the problems inherent in combining non-exempt personnel of the Chemical Workers and Operating Engineers in the same operation have been made. Such a combination offers opportunities for reducing operating costs through better utilization of manpower and increased personnel burn-out time.

2. Trips

E. W. Wilson, with E. M. Kratz, Process Design, visited the steam plant of the Olympia Brewery at Tumwater, Washington, on August 20, 1959, for the purpose of inspecting the steam generating facilities to obtain operational information. This unit was listed as an installation containing a Riley steam separator by one of the vendors bidding on the main exchanger.

D. Consulting Engineers

1. Activities

Information requested by the AEC for the Federal Power Commission study consisting of data on reactor operating characteristics and fuel and operating costs in the power-only period was assembled and transmitted to the Commission in document HW-61559, "NPR Data for Federal Power Commission Conversion Studies." A presentation of some of this same information and other facts regarding the design of the NPR plant was made before a meeting attended by Francis L. Adams and L. S. Wing of the Federal Power Commission on August 31.

Preliminary arrangements were made for participating in a study with AEC, FPC, and BPA representatives on the effect of transmission of power from the N-Plant into the BPA system relative to the quality of electric power service to the existing reactor plants.

A letter, "Current N-Plant Electrical Power Supply System Concept to Meet Reliability Criteria," dated August 25, 1959, was issued, discussing the latest concept of the electrical power system for the N-Plant with reference to reliability.

2. Significant Reports Issued

HW-61559 - "NPR Data for Federal Power Commission Conversion Studies," August 14, 1959.

E. Program Evaluation

1. Activities

Schedules

At present there is no established official schedule for the overall project work. Kaiser Engineers is responsible for coordinating this effort. To date they have prepared several preliminary schedules primarily based upon initial schedules prepared by Burns and Roe and GE. A great deal of integration has transpired and now Kaiser is formulating their construction program to where a realistic schedule will be forthcoming. During July, the AEC asked that a monthly meeting be held with Burns and Roe, Kaiser Engineers, and General Electric in attendance. The purpose of this meeting is to discuss the overall integration features of the schedule and ways of improving troublesome spots.

The overall project schedule is definitely procurement limited. Initial procurement activities are suffering primarily from the delayed resolutions of the previously established design bases and cost reduction programs. The following covers the design status.

	Wt'd Total	Certified Schedule	Actual % Complete
Reactor Plant as of 8-31-59			
Title I			
Scope		85	83
Title II			
Drawings	70	15.5	18.5
Specifications	8	9	6.2
Requisitions	8	0.0	0.75
ATP's	4	0.0	0.0
Development and Testing	10	43	43.0
Total	100	16	17.81
Heat Dissipation Plant as of 8-31-59			
Title I			
Scope Criteria(1)		39	40.65
Title II as of August 21, 1959			
Detail Design(2)		27	20

		No. Issued to 8-21-59	
	No. Req'd	Scheduled	Actual
Criteria	(a)	(a)	4
Preliminary Drawings	25	23	23
Detail Drawings	580	(b)	40
Specifications	185	(b)	19
Requisitions	150	(b)	5
ATP's (No. being developed)	(a)	-	0

Note: (1) The scope schedule was revised on 8-3-59. Previously the scheduled completion for 9-1-59 was 100 percent.

(2) Burns and Roe are submitting a new Title II design schedule during the first week of September.

(a) Number being established.

(b) Being revised by Burns and Roe.

Cost and Estimates

In May, the AEC directed Kaiser Engineers to prepare an official cost estimate and directed Burns and Roe and General Electric to assist Kaiser in this effort. Since that time, regular meetings have been held and a current cost estimate will be submitted to the Commission on September 8, 1959.

ACTING MANAGER
NPR PROJECT SECTION

WW McIntosh:mf